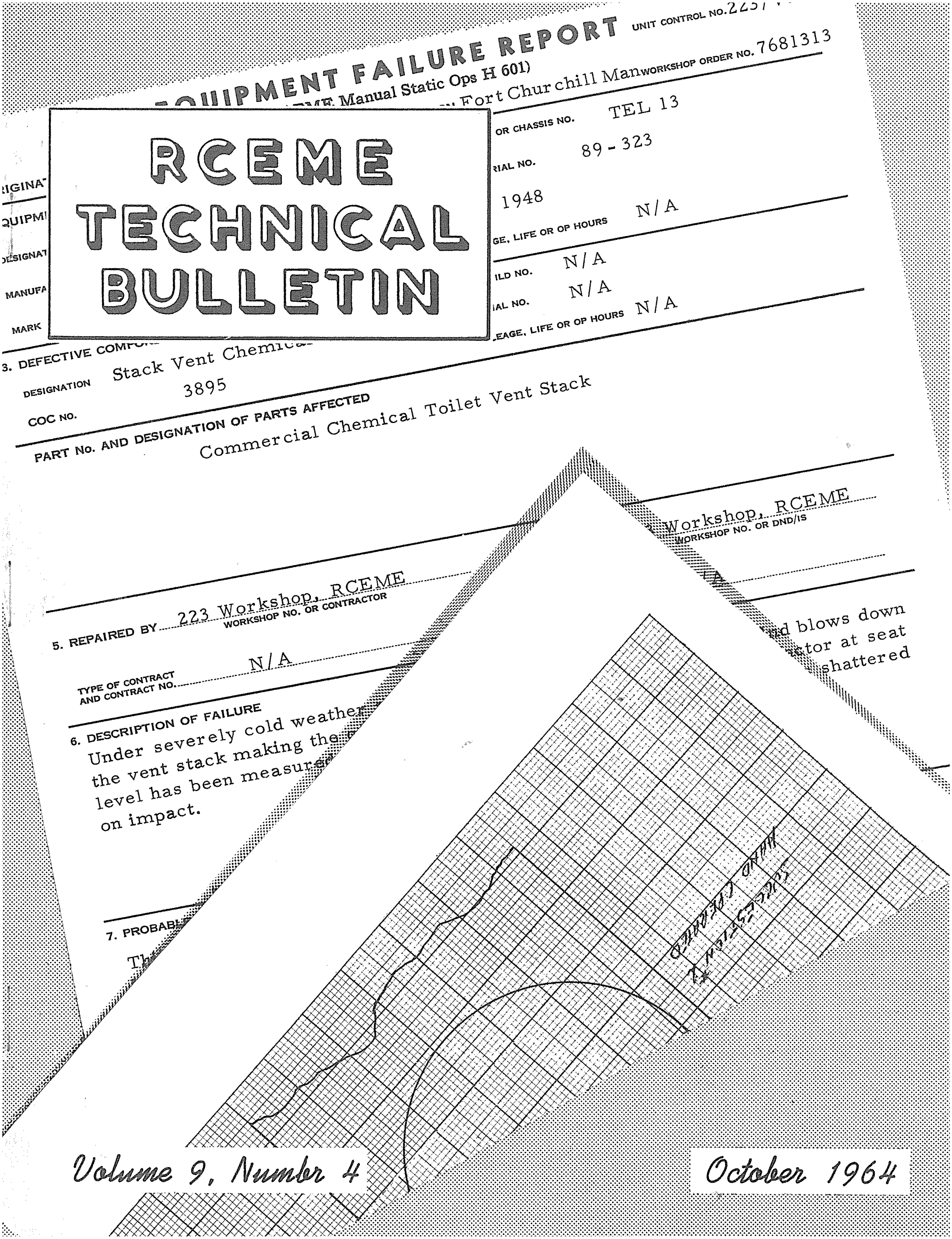
RCEME TECHNICAL BULLETIN



EQUIPMENT FAILURE REPORT UNIT CONTROL NO. 2257

EME Manual Static Ops H 601)

Fort Churchill Man WORKSHOP ORDER NO. 7681313

ORIGINAT

EQUIPMI

DESIGNAT

MANUFA

MARK

OR CHASSIS NO. TEL 13

SERIAL NO. 89 - 323

1948

MILEAGE, LIFE OR OP HOURS N/A

BUILD NO. N/A

SERIAL NO. N/A

MILEAGE, LIFE OR OP HOURS N/A

3. DEFECTIVE COMPO

DESIGNATION Stack Vent Chemical

COC NO. 3895

PART No. AND DESIGNATION OF PARTS AFFECTED Commercial Chemical Toilet Vent Stack

Workshop, RCEME

WORKSHOP NO. OR DND/IS

5. REPAIRED BY 223 Workshop, RCEME

WORKSHOP NO. OR CONTRACTOR

TYPE OF CONTRACT AND CONTRACT NO. N/A

6. DESCRIPTION OF FAILURE

Under severely cold weather … and blows down the vent stack making the … ctor at seat level has been measure… shattered on impact.

7. PROBABLE

Th

Volume 9, Number 4

October 1964

RCEME TECHNICAL BULLETIN

CONTENTS

Page

Gen McNaughton Scroll 2
The Case for the Craftsman 4
RCEME in the Air 8
The School in Pictures 10
Who Knows More than I Do? 11
33 Tech Squadron, Sudbury 13
Spring Brakes 14
RCEME Cencom Golf 18
Machines or Instructors 19
More Technic Teasers 22
Spark or Sputter 23
The Manometer 24
How to Run a Great Train Robbery 26
Technical Notes 28
Training Notes 37
Answers to Technic Teasers 38

COVER: Equipment Failure Report – To learn why these reports are important turn to page 11.

This publication is issued under the authority of Col A Mendelsohn, CD, Director of Electrical and Mechanical Engineering. The contents have been edited and approved by Lt Col CMR Elmsley, CD.

The Bulletin is published to assist RCEME personnel in keeping abreast of current trends and developments and to circulate interesting news about the Corps. The information and statements herein are not to be quoted as authority for action.

EDITORS

Lt Col CMR Elmsley, CD
Mr DC Paterson

ASSOCIATE EDITORS

Col GW Thompson, CD
Col KR Ward, CD
Lt Col H Goodfellow, MBE, CD
Lt Col WG Hamilton, MBE, CD
Lt Col HM Robinson, CD
Lt Col GT Kirk, MBE, CD

WHAT DO YOU THINK ?

Is there not only a place but a real need for the 'traditional craftsman' in RCEME? S sgt P Johnson, winner of the Director's Prize Essay Competition (The Case for the Craftsman, page 4) thinks there is, in spite of the fact that modern production techniques seem to have driven the craftsman from the production scene and to be driving him from the maintenance scene.

We think few from RCEME and we hope few from the other elements of the Army whom we serve will disagree with him. But the obvious question arises - How can our 'traditional craftsman' exercise and keep his skills when more and more the design and manufacture of equipment limits what he can do to it, except under conditions approaching those of the laboratory?

Maybe this question is more obvious than basic. Maybe our conception of the 'traditional craftsman' is too much influenced by memories of the manual dexterity, the sense of touch, and the apparent intuition of some tiffy who taught us long ago. Possibly none of these was the fundamental characteristic that made him a tiffy and therefore a craftsman.

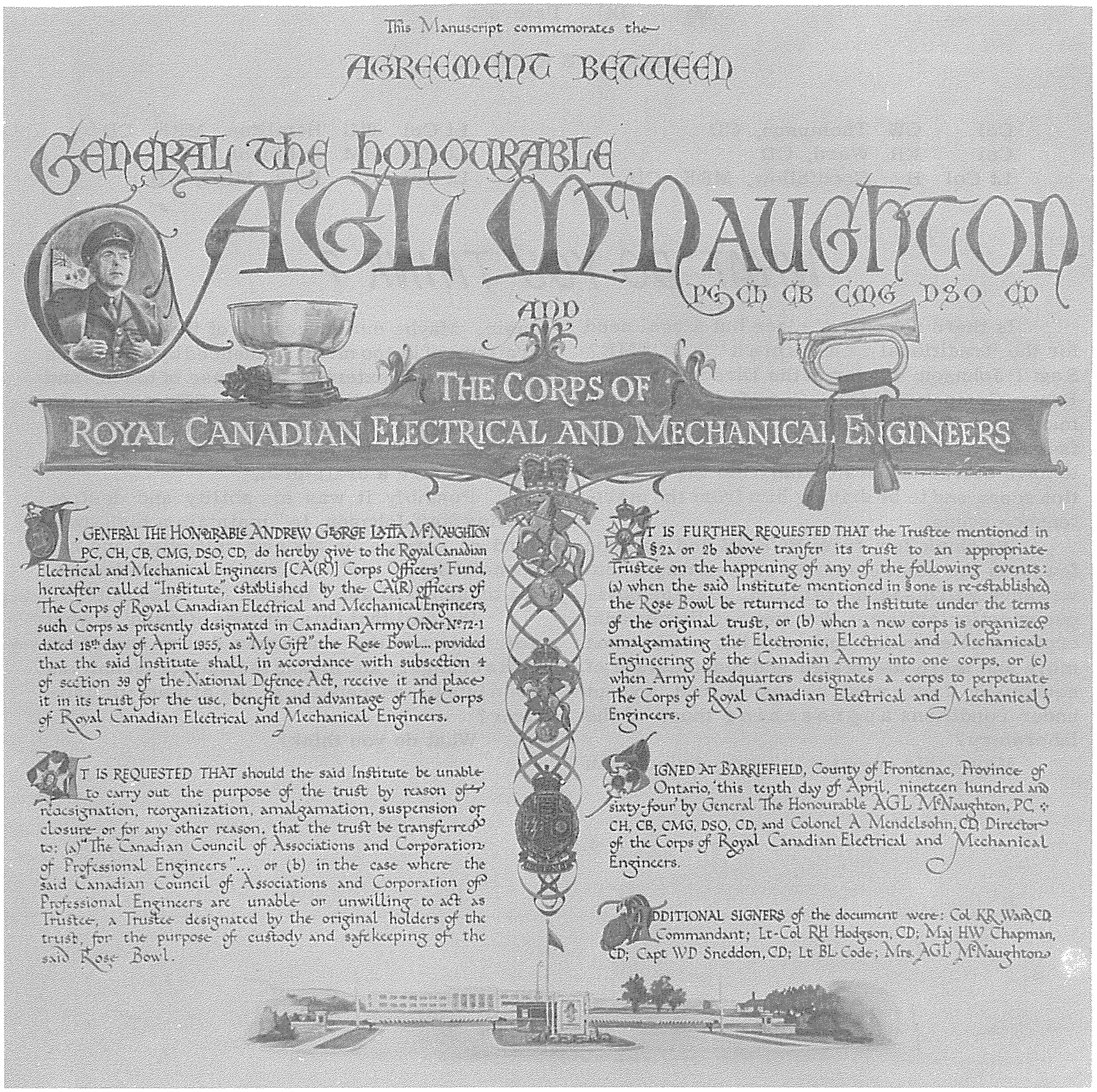
Possibly it was his ability and desire, quoting Staff Johnson, to "maintain a high standard of service on his own initiative and responsibility," and, as our own contribution, his tendency to ask "Why?" or "Why not?"

We feel that this attitude of mind is what differentiates the craftsman from the mere parts changer, and makes the master technician the direct descendant of the armament artificer?

What do you think?

Our Commemorative Scroll

This Illuminated Scroll recently presented to the School commemorating the signing of a Trust Agreement between General, The Honourable AGL McNaughton, PC, CH, CB, CMG, DSO, CD, and The Corps of Royal Canadian Electrical and Mechanical Engineers was designed and executed in his own time by Master Radio Technician Sergeant Jean-Paul Champagne, RCEME, in consultation with the Special Projects Section of the Directorate of Electrical and Mechanical Engineering, Canadian Army Headquarters, Ottawa, Canada, during the months of May, June and July 1964.



This Manuscript commemorates the
AGREEMENT BETWEEN
GENERAL THE HONOURABLE
AGL McNAUGHTON
PC CH CB CMG DSO CD
AND
THE CORPS OF
ROYAL CANADIAN ELECTRICAL AND MECHANICAL ENGINEERS

I, GENERAL THE HONOURABLE ANDREW GEORGE LATTA McNAUGHTON PC, CH, CB, CMG, DSO, CD, do hereby give to the Royal Canadian Electrical and Mechanical Engineers [CA(R)] Corps Officers' Fund, hereafter called "Institute," established by the CA(R) officers of The Corps of Royal Canadian Electrical and Mechanical Engineers, such Corps as presently designated in Canadian Army Order No 72-1 dated 18th day of April 1955, as "My Gift" the Rose Bowl... provided that the said Institute shall, in accordance with subsection 4 of section 39 of the National Defence Act, receive it and place it in its trust for the use, benefit and advantage of The Corps of Royal Canadian Electrical and Mechanical Engineers.

IT IS REQUESTED THAT should the said Institute be unable to carry out the purpose of the trust by reason of reacsignation, reorganization, amalgamation, suspension or closure or for any other reason, that the trust be transferred to: (a) "The Canadian Council of Associations and Corporation of Professional Engineers"... or (b) in the case where the said Canadian Council of Associations and Corporation of Professional Engineers are unable or unwilling to act as Trustee, a Trustee designated by the original holders of the trust, for the purpose of custody and safekeeping of the said Rose Bowl.

IT IS FURTHER REQUESTED THAT the Trustee mentioned in §2a or 2b above tranfer its trust to an appropriate Trustee on the happening of any of the following events: (a) when the said Institute mentioned in §one is re-established, the Rose Bowl be returned to the Institute under the terms of the original trust, or (b) when a new corps is organized amalgamating the Electronic, Electrical and Mechanical Engineering of the Canadian Army into one corps, or (c) when Army Headquarters designates a corps to perpetuate The Corps of Royal Canadian Electrical and Mechanical Engineers.

SIGNED AT BARRIEFIELD, County of Frontenac, Province of Ontario, 'this tenth day of April, nineteen hundred and sixty-four' by General The Honourable AGL McNaughton, PC, CH, CB, CMG, DSO, CD, and Colonel A Mendelsohn, CD, Director of the Corps of Royal Canadian Electrical and Mechanical Engineers.

ADDITIONAL SIGNERS of the document were: Col KR Ward, CD, Commandant; Lt-Col RH Hodgson, CD; Maj HW Chapman, CD; Capt WD Sneddon, CD; Lt BL Code; Mrs AGL McNaughton.

The Corps colours are represented by the use of cerulean blue, gold leaf and crimson lake.

The decoration of the Scroll was limited to objects personally associated with the General and The Corps.

The lunette portrait of the General is after the famous Karsh portrait of the 16th of March 1942. The keen observer will note that the eye-glasses held in his right hand in the Karsh portrait have been omitted. Behind the General, flies the flag of the senior formation of the Canadian Army Overseas, designed by Colonel Fortescue Duguid (then Director of the Army Historical Section) and approved by the Minister on the 7th of December 1939. This flag was flown by the General during his overseas command. An extract from a letter by Colonel Duguid to Colonel EW Sansom, DSO, written on the 25th of November 1939 records:

> "It will be noted that the design is directly adapted from the Armorial Bearings of Canada as assigned by Royal Proclamation, 21st November, 1921, and also that the devices used are all already authorized, and that each is placed in accordance with laws of heraldry to express its proper significance,
>
> a. Three maple leaves proper, conjoined on one stem on a white field, the correct device for Canada.
>
> b. Great Britain is represented by the union, in a canton next the staff.
>
> c. Old France is represented by three gold fleur-de-lys on a blue ground, within a circle indicating 'an ancient and honourable connection'."

Sgt Jean-Paul Champagne

Sgt Champagne is the grandson of Joseph Fortunat Champagne, the designer of Canada's first Coat of Arms (1919-21). For many years Mr Champagne was responsible for the superb artistry and illumination done in the office of the Secretary of State.

Our sergeant has inherited much of this artistry. Working from 1948 to 1957 under the direction of LCDR Alan B Beddoe, OBE, he lettered and illuminated the pages of the Second World War Book of Remembrance, now on view in the Memorial Chamber under the Peace Tower, Ottawa.

And now this scroll.

The Generals' Rose Bowl, the subject of the Agreement, is flanked with two of his favourite deep red roses - and bears the inscription:

"In Commemoration of the first two Decades of
The Corps of Royal Canadian Electrical and Mechanical Engineers
and to Express Faith and Confidence in the
Continued Service of the Corps to Canada."

The tasselled bugle commemorates the sterling silver bugle he presented to The Corps on its sixth birthday in 1950.

The Corps badges in the central column supporting the Scroll are those worn by The Corps during the General's appointment to The Corps of Honorary Colonel, 12 March 1946 - 18 March 1949; Honorary Colonel Commandant, 19 March 1949 - 19 September 1962 and Colonel Commandant, 20 September 1962 - 18 March 1964. These badges are blazoned as follows:

Original Badge adopted 15 May 1944;

"On wreath of laurel three escutcheons; the first raised and charged with Ordnance Arms; the second, lightning flashes; the third a gearwheel. The whole ensigned with the

The Case for the Craftsman

S sgt Peter Johnson

Craftsmanship, in the traditional sense of the word, is a sentimental memory and the traditional craftsman is an anachronism in the modern industrial world. The truth of this statement is acknowledged with regret every time a poorly-made, mass-produced article is purchased, every time a poor but expensive repair job must be paid for; but what is regretted is not really the passing of the craftsman. What is regretted is the passing of the craftsman's reputedly high standard of workmanship.

S sgt Peter Johnson, at present employed in the Technical Services section DEME, is a radar technician and has been in the RCEME since 1954.

Born in Hull, England, in 1930, Peter attended the Hull Grammar School. During his two years National Service he served with the Royal Military Police and did a tour with the British Army on the Rhine (1949-1950). He married in 1951 and the family emigrated to Canada in 1953, shortly after the birth of their daughter.

He has worked as a clerk, farm machinery mechanic, blacksmith, machine operator, bartender and farm labourer, but is now grateful to the PSO who persuaded him to go into the radar trade in RCEME. His hobbies are reading, and "dabbling" in anything which attracts his interest.

Having acquired during a long apprenticeship an excellent knowledge of his trade, and having always the interest and enthusiasm to learn more, the craftsman accepted personal responsibility for the quality of his work and took both pride and profit from the production of articles made to the best of his ability. Today this attitude to work is virtually non-existent.

In the modern assembly-line mass-production system of manufacturing the sense of personal responsibility is lacking, and there is neither the incentive nor the opportunity for the individual to produce articles of a better quality than is required to pass a minimum standard inspection. As one of a group of assemblers the individual must perform his function within specified tolerances, and no deviation from these tolerances can be permitted if all the individual operations are to be combined satisfactorily. For speed and efficiency the manufacture of an article is broken down into a series of simple tasks which can be easily learned and rapidly performed, and it is not essential to the overall efficiency of the system that the individual should know anything

(continued next page)

SCROLL (continued from overleaf)

Tudor Crown. Below the wreath, a scroll inscribed 'R.C.E.M.E'."

Present Badge adopted 27 February 1950;

"Superimposed upon a lightning flash, a horse forcene, gorged with cornet of four fleur-de-lys, a chain reflexed over its back and standing on a globe inscribed with the Western Hemisphere. Superimposed across the lightning flash behind the horse's head, the scroll inscribed 'R.C.E.M.E.'; the whole surmounted by the Tudor Crown.

The Tudor Crown was replaced with the St Edward's Crown in 1952.

The sketch of the entrance to RCEME School commemorates the unveiling of the Memorial Gates by the General in October 1961.

The General's Badge of Honour, Insignia of his Orders of Chivalry and his decorations have been used in the illumination of the versals.

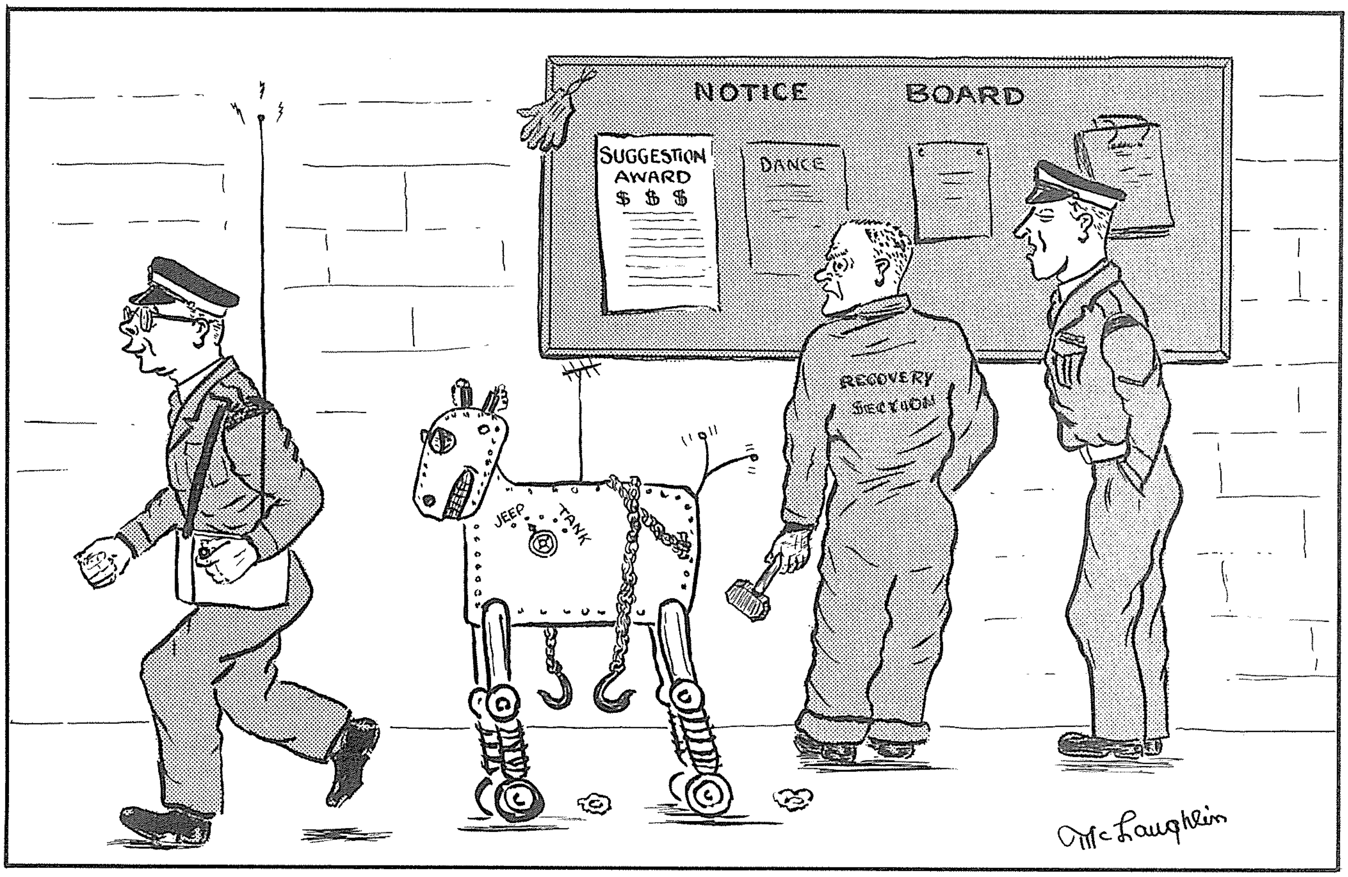
A photo copy of the original Agreement has been placed inside the frame of the Scroll.

about the finished product. Anonymous, involved in only a small part of the production train, performing a simple, repetitious task as rapidly as possible, the assembly-line 'hand' cannot have the same pleasure and pride in his work that is characteristic of the traditional craftsman.

The undesirable emotional effects of the system on the individual are discounted in the interest of overall efficiency and economy. Experience has proved that the division of labour in the assembly-line system enables goods of a standard, acceptable quality to be produced more cheaply and in greater quantity than is possible by the combined efforts of individual craftsmen. Workers can be trained quickly in the simple skills required; the standard, acceptable quality of workmanship is maintained by a group of inspectors; and a special department is made primarily responsible for improving the product.

Traditional craftsmanship, the individual's sense of responsibility for the excellence of the finished product and his interest and enthusiasm about creating a better product, is not required in the manufacturing field. Its place has been taken by an impersonal, systematic procedure of scientific quality control which maintains high standards of efficiency and economy, and the retention of the traditional craftsman is neither necessary nor desirable.

Only in the servicing industry has there been any widespread requirement for traditional craftsmen since the advent of mass-production. For many years repairs involved the replacement of individual components, and the repair mechanic or technician had to have a detailed knowledge of the construction of the equipment and its operation. He retained the traditional craftsman's close personal contact with his customers; the sense of personal re-



THERE GOES "OLD SUGGESTION AWARD" HIMSELF TO SEE THE C.O. —CLAIMS HIS INVENTION'S GOING TO MAKE RECOVERY VEHICLES OBSOLETE!

sponsibility for the quality of workmanship; and the interest and enthusiasm to learn as much as possible about the equipment on which he worked. Because of his expert knowledge of the equipment he was capable of making emergency repairs by substitution and modification of components when the correct spare parts were not available, thus maintaining a high standard of service on his own initiative and responsibility. To this extent the tradition of craftsmanship was maintained by the repairman both in his training and in his attitude to his work. This, however, is gradually changing.

The development of modular construction of equipment has led to the decline of the craftsman in the servicing industry. To an ever-increasing extent, self-contained, easily replaceable modules are being used in the construction of many types of equipment. The sealed freezer unit in the home refrigerator; the plug-in units used in electronic computers, in radio and radar sets; even factory rebuilt assemblies for cars and trucks; these are all examples of this trend. The repair of the majority of faults on such equipment requires only the replacement of a module, the defective module being either scrapped or returned to the factory for repair. The advantages of this system are that modules can be designed so that they can be replaced quickly and easily; mass-production and repair of modules reduces the unit cost, and repair technicians require minimum training in the theory of the equipment. Only a very few mobile specialists, manufacturers' technical representatives, are required to find and correct the more difficult faults.

The emphasis in repair servicing, as in manufacturing, is upon speed and efficiency, and in both cases it has been found that this can be best achieved by reducing the human element. There is a direct comparison between the simple tasks assigned to the assembly-line 'hand' and the increasingly simple tasks which the repairman is called upon to perform. Even the recognition of faulty modules is being simplified and more and more the repairman's only function is the purely mechanical one of replacing modules.

Naturally, since a man trained under this system can repair an equipment only by replacing modules, a reliable supply of the modules he requires must be available. However since modern transport and communications are fast and reliable, large, central, computer-controlled stocks of modules can be located within a few hours of any location where they may be needed, and the supply of modules can be assured without maintaining large, uneconomical, local stocks.

With the steady reduction of servicing to a series of simple, repetitive tasks the need for the repair craftsman is disappearing and with it the craftsman's standard of workmanship. The sense of personal responsibility is again shifted upon the shoulders of the inspectors who pass the modules at the factory, and as this method of construction and repair becomes more widespread the craftsman will become as rare in the servicing industry as he is in the manufacturing industry.

The disappearance of the traditional craftsman, his gradual relegation to an anachronism, has depended upon the predictability and reliability of the factors involved in his work. In both manufacturing and servicing, where possible, the factors involved have been subjected to analysis, and rigid controls applied to standardize operations and make the factors as rigidly predictable as possible. For many years it was difficult to standardize servicing operations because of the methods of construction of equipment and the unreliable nature of transport and communications between the spare parts source and the location of the equipment, therefore the craftsman was required for a longer period in the servicing field. However, as these problems have been overcome, by the development of modular construction and improvement of transport and communications, the requirement for craftsmen in the servicing industry has steadily decreased to the point where the truth of the original statement is beyond dispute – traditional craftsmanship is a memory and the craftsman is an anachronism in the modern industrial world.

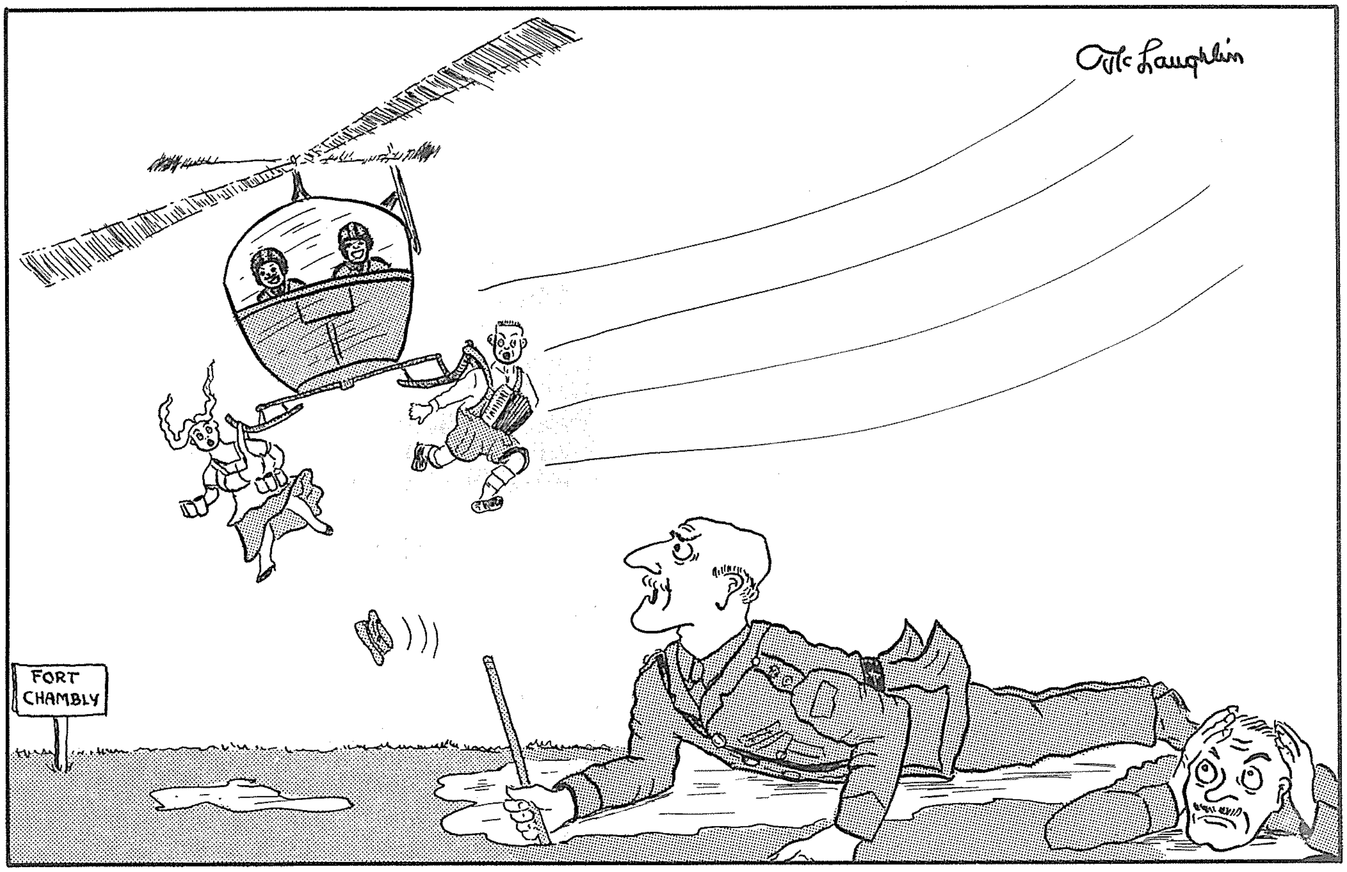
The RCEME is a part of this modern industrial world, and a great deal of time and effort is being devoted to the improvement of the efficiency and economy of RCEME operations by the adoption of modern industrial techniques. We have time accounting, statistics, work study and the development of Standard Repair Times, the use of Critical Path Planning, the constant efforts to introduce modern, up-to-date tools and test equipment, and now the new Management Company in the RCEME School. More and more complex equipment is being bought from other countries with different repair systems to ours and this also influences and causes changes in RCEME repair procedures and tends to bring them more and more in line with current industrial practice, with all that that entails.

As in industry, the trend is increasingly towards scientific analysis of the RCEME repair problem, the isolation of the predictable and reliable factors, and the creation of procedures to cover all anticipated situations. The fact that after due consideration these techniques are being eagerly adopted by the RCEME is all the proof that is required that they work.

However, the function of an Army is to prepare for war, and the many variations on the accepted statement that war is an art, the many lists of the principles of war, have one common, significant feature – they emphasize the unpredictability of war. In view of the fact that the techniques described depend for their success upon the predictability and reliability of the contributory factors, there would seem to be a good case for continuing to train and encourage the RCEME craftsman to be just that – a craftsman, in the traditional sense of the word: a man who has an expert knowledge of his equipment, who is capable of making emergency repairs, who is trained to adapt himself quickly to unpredictable circumstances; a man who can maintain a high standard of service on his own initiative and responsibility.

For many people the case against the craftsman in RCEME remains 'not proven'. There is a widespread feeling that, despite the present trend, the craftsman in RCEME is not an anachronism and the spirit of traditional craftsmanship should continue to be fostered for the good of the Corps and the Army.

(For an interesting sidelight
on OKTOBERFEST see page 22)



OKTOBERFEST MY EYE! MAJOR, I'LL GIVE YOU TEN MINUTES TO GET THAT CREW INTO MY OFFICE FOR A .... VERY SPECIAL DEBRIEFING...

RCEME IN THE AIR

R.C.E.M.E.
IN THE AIR!

THE CASE OF THE $60,000 WRENCH

Our title sounds like a Perry Mason mystery and, in a way, this is appropriate.

On the day of the crime, low-hanging clouds and a cold drizzle made a perfect setting. Perhaps you were there. If so, you would have been listening to the smooth, piercing whine of a jet engine being run up.

Suddenly the whine changed to a series of explosions, terminated by the screech of tortured metals as the widely vibrating engine wrenched free of the aircraft and crashed to the ramp. After the smoke and confusion subsided, the bits and pieces of the murder weapon were removed from the dead carcass of the victim. It didn't take a Perry Mason to find that the weapon was once a one, each, wrench, four inch, adjustable.

The victim? Sixty thousand dollars worth of jet engine, now only worth its weight in scrap metal.

The mystery? Quite simple. Who owned the wrench? Who left the d... thing where it would be gobbled up by the ever-hungry engine? Minor maintenance was done on the engine just prior to the fatal runup. How did the wrench escape the eagle-eyed inspectors? More important, what are YOU doing to keep an accident like this from happening around YOUR base?

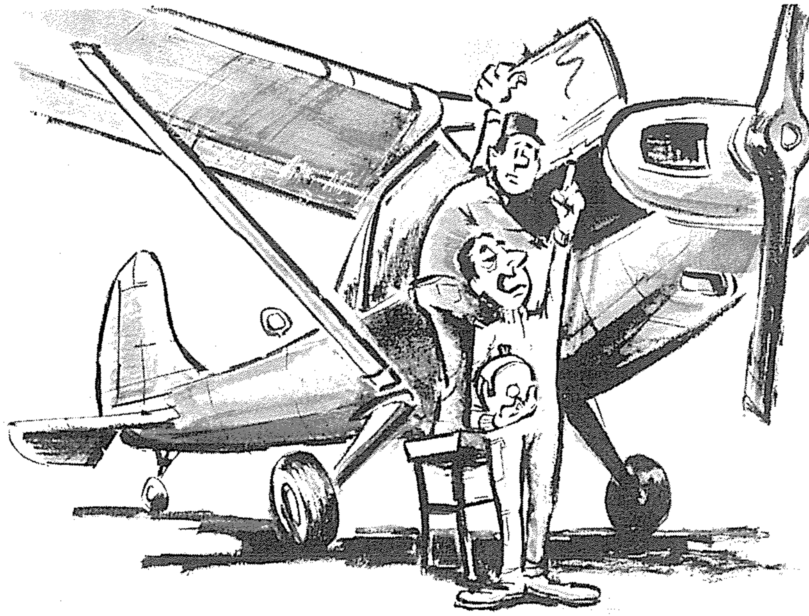
OF MICE AND MEN

The housing shortage is being felt even in the animal kingdom. Here is a case where a parachute served as a maternity ward. The parachute in question was placed hanging up in a locker but with the seat part resting on the bottom of the locker. This occurred on a Thursday and the student pilot did not fly until the following Tuesday.

On taking the parachute out of the locker the student's curiosity was aroused by a small squealing noise. This is when he discovered he had become a god-father to six little mice. Needless to say, the parachute was returned to the Safety Equipment section to be replaced with new nesting material.

Of course this is an isolated case but if possible, parachutes should be hung up on the pegs provided. By doing this, parachutes can be kept clean and also out of the way of pregnant animals, unless of course, they carry their own ladder. Take care of your parachute, you may need it someday.

Diagnosing the Trouble



Capt Kenneth E Cox
in US Army Aviation Digest

Imagine the exasperation of the crewchief of an 0-1 when the pilot taxis back from a pretakeoff runup, shuts the engine down, and simply writes "rough running engine" in the -13. This writeup might be valid to the pilot, but tells the mechanic as much as the Chairman of the Board might mention about the Coca Cola formula.

"Oh, Lieutenant Gnuzzelgunch! Sir, would you wait up a moment? I'll get right on this engine. Can you tell me what the indications were when you ran'er up so I'll know where to start troubleshooting?"

Lieutenant Gnuzzelgunch stops, shifts his flight helmet to the other hand, and gives the appearance that he's conducting a high level strategic defence briefing for a touring WCTU group.

"Everything checked OK until the 1700 rpm ignition check. I started from 700 rpm and increased the throttle to 1700, observing the generator kick in around 1300. At 1700 I made the mixture and carburetor heat check — all OK. Then during the magneto check (still at 1700 rpm) I got a 50 rpm drop when I switched from BOTH to LEFT. The rpm returned to 1700 when I switched back to BOTH.

"When I switched to RIGHT I got a 150 rpm drop and a rough running engine — no backfire or afterfire. The rpm returned to 1700 when I switched back to BOTH. I idled back to 750 for the idle mixture leanout check. As I brought the mixture control to the rear the rpm increased to 780 before falling off. Naturally I returned the mixture control to the FULL RICH position and proceeded with the full acceleration check. I could get only 1900 rpm out of her, so I let her cool off as I taxied back in to shut down. What do you think is wrong with her?"

"Well Sir, I know what is wrong."

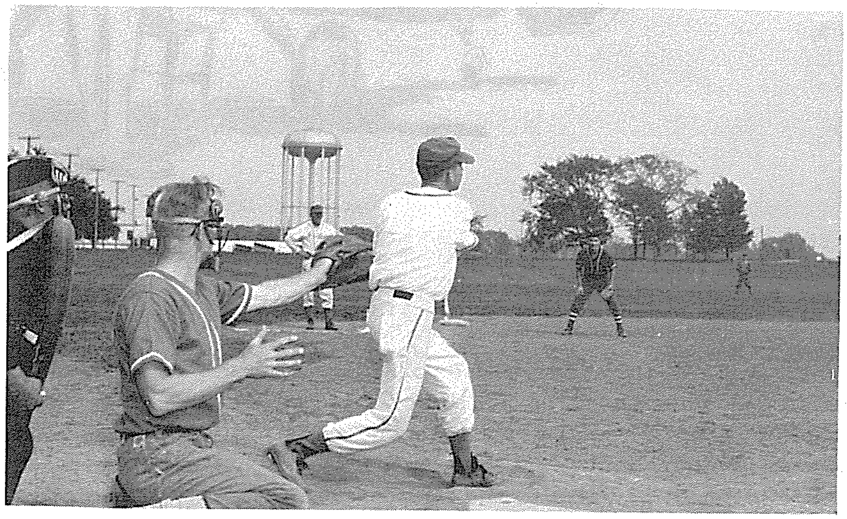
If you can't diagnose the trouble, turn the page around, and read the answer (which you should have entered on the -13).

ANSWER: If you diagnosed a dead cylinder plus a third dead plug of any of the upper right or lower left plugs, you are correct. Did you overlook the fact that the idle mixture leanout at 750 rpm exceeded its 15 rpm increase tolerance — giving a too rich idle mixture which the crewchief can adjust?

The School in Pictures

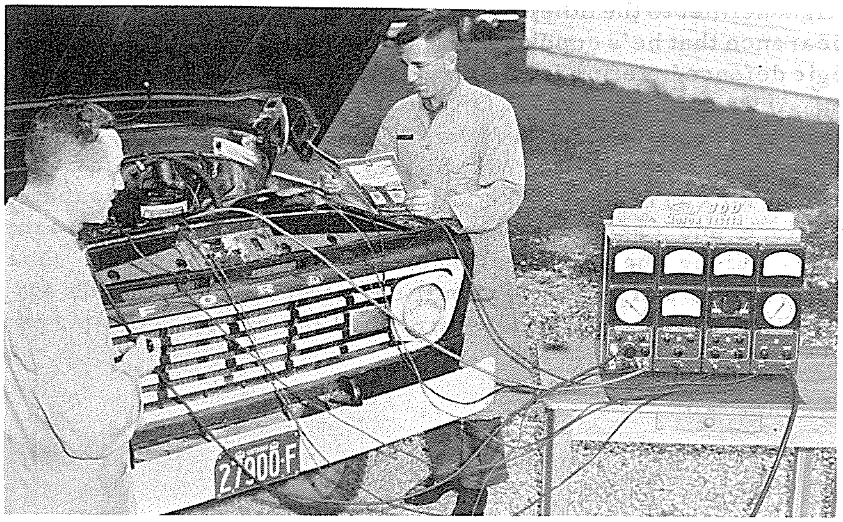
Capt WA Thomas

Four modern horsemen, left to right, Sgts RL Goodall, A Toth, CE Weisenberg, and BL Nickerson, arrange newly painted engineer equipment prior to start of technical training at Vehicle Company, the RCEME School.



Cfn AD Keyes, a student vehicle mechanic drives a high ball to left field during recent fast ball series between the Royal Canadian School of Signals and the RCEME School.

Ssgt CE Thibault (left) and Ssgt LM McClafferty, carry out preparation on new Sun 800 Motor Tester at Vehicle Company, the RCEME School.



Play Ball!

MANY RABID baseball fans recall Ping Bodie, a baseball umpire who had a unique way of making a point.

Years ago Bodie was absorbing an unusually heavy amount of abuse from the fans while calling a minor league game in California. Suddenly Ping threw up both arms and stopped the game. He walked up into the stands, adjusted his chest protector, and bellowed, "Play ball!"

The team managers rushed up to Bodie and demanded to know what he was doing. "Well," Bodie drawled, "if these folks can see 'em better from up here, then here's where I'll call 'em from. Play ball!"

Too often we find ourselves reacting like baseball fans — blithely criticizing some aspect of Army Aviation as if we were in the best position to judge all actions, when actually we're sitting up in the stands.

The *least* we can do is take a tip from Ping Bodie. He was willing to view the situation from all angles.

U. S. ARMY AVIATION DIGEST

Dement T. Rowdy* Asks ....

WHO KNOWS MORE THAN I DO?

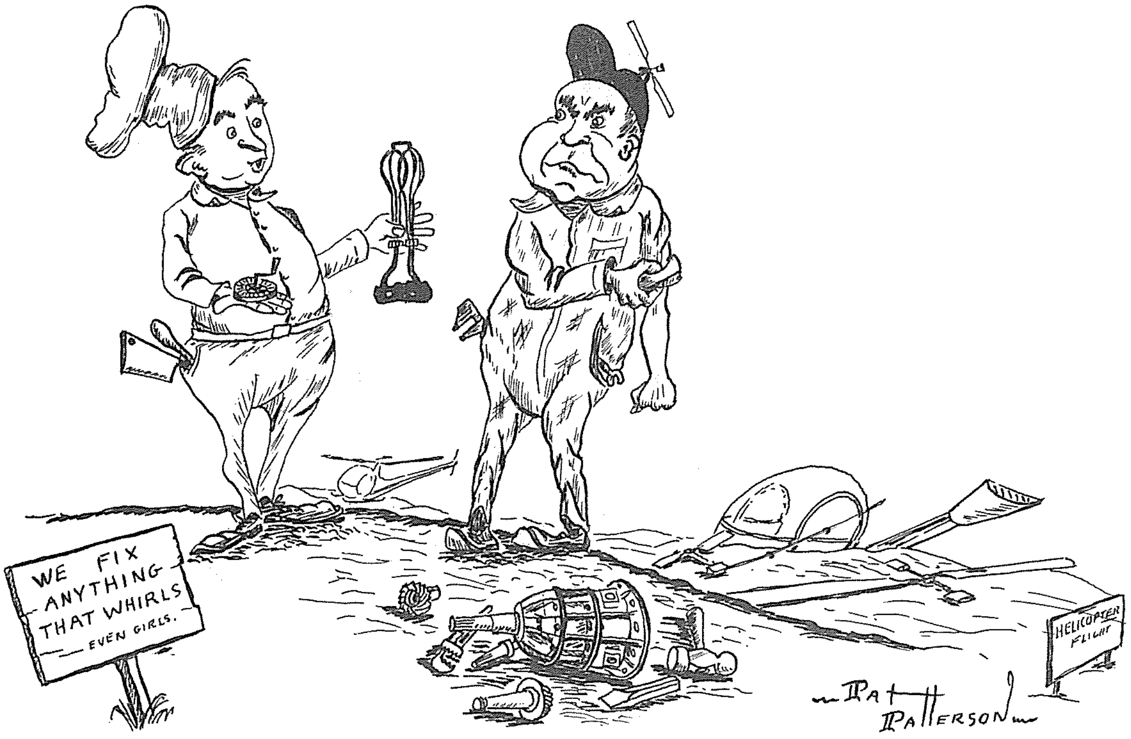
.... about an EFR

It is really just a matter of communication but, like trying to let that babe at the other end of the bar know what you are thinking, it is sometimes difficult. This is where the craftsman, corporal and sergeant in the Field know more than the captain, major or lieutenant colonel in Ottawa. The man turning the wrench or hunting for the test leads knows in detail the faults, weaknesses and general condition of the equipment he works on daily. In Ottawa all that is known is what a few test items did when the equipment was put through acceptance trials. The flow of information from the man-who-knows to the man-who-needs-to-know is just not happening. The primary vehicle for passage of this technical information is the Equipment Failure Report - but this vehicle seems to have square wheels.

The first problem is what to communicate. With the situation of the blonde at the bar this is no problem but with the people in

---

*For a portrait of the author in earlier days turn to page 17.



Ottawa it is a different matter. You - the man in the field - know all about what is happening but what part of it should be sent on up must be decided. You see the repairs flowing through, often the same, sometimes new and different. What initially looks like normal wear or failure becomes so frequent that it should be considered abnormal, but because of its very familiarity you don't send in a failure report until the operator screams and the panic is on. Because of special operating conditions, a change of requirement, or tactical expedient, the operator will often change his procedures, sometimes causing undue wear or damage to the equipment. If another panic is to be avoided someone should tell Ottawa so that the equipment can be altered, the operator stopped, or additional backup can be purchased. In short, anything - fair wear or tear or even high incidence of fair tear or rapid wear - should be reported.

The equipment failure report form was designed as an easy method of such reporting, but people being people it isn't working that way. Because there are sections of the form asking probable cause and suggested correction, many individuals spend time they can ill afford conducting investigation and trials. Or conversely don't send in the report because there is no time for such investigation. This is nice to have but there are high-priced agencies all the way up to the National Research Council who are paid for this kind of thing, and their establishments are not as restricted or short-handed as ours. The identification and historical portion of the form down to para 5 is usually easy to fill in and is vital - of course if any item is not applicable or cannot be ascertained this should be indicated. Photographs, or small items that can be taped to the form, are a great aid in both this area and in the description of the failure.

The description is the meat of the subject and should include all the available faults. Remember that the man who drives a desk may not have been near the field for some years and what to you is self-evident to him is a mystery. Don't let the small space limit you - tag sheets on the back.

The probable cause of failure and suggested method of correction and other remarks portion of the form is put there because you are the most likely person to know the answers. However if these items are not self-evident

(continued on page 17)

That slogan has got to go!

33 TECHNICAL SQUADRON, SUDBURY

Cfn AE McVittie wins "Best Craftsman" Trophy

At a student Militia Graduation Ceremony in Sudbury 14 Aug 64, Cfn AE McVittie, was presented with a trophy for being judged the best craftsman on the course.

The trophy was donated by members of the 33 Technical Squadron RCEME and presented by the unit OC, Major LM Ramsey.

The course, which started 13 Jul 64, was run jointly by the 58 Field Regiment RCA and the RCEME squadron for 59 Sudbury district students.

Our photo shows Maj Ramsey shaking hands with Cfn McVittee while RSM Carl Fisher holds the trophy.

—Sudbury Star photo

SUDBURY AREA ARMY CHAPLAIN GIVEN PROMOTION

Protestant chaplain for the Sudbury militia, Rev. William C. McBride, has been promoted to rank of Major, effective as of June 8.

Rev. McBride, minister of Knox Presbyterian Church here, is officially attached to 33 Technical Squadron, RCEME.

He is no stranger to the army. In 1928 he joined the Royal Montreal Regiment as a private and qualified as a sergeant before he left the unit to begin his studies for the ministry.

At the University of Saskatchewan he joined the Canadian Officer Training Corps and was promoted to lieutenant before he began his theological studies at Presbyterian College in Montreal.

One year after his ordination he was appointed chaplain in the Canadian army and was sent overseas to become padre of No. 17 Canadian General Hospital in England.

Later he was padre of No. 1 Canadian Repatriation Depot and remained there until almost all Canadian troops had returned to Canada.

Rev. McBride again became active in the militia in 1949 when he was appointed padre of the Toronto Scottish Regiment.

Earlier this year, he was awarded the Canadian Forces Decoration presented by Brig. J. F. Westhead when he inspected Sudbury garrison.

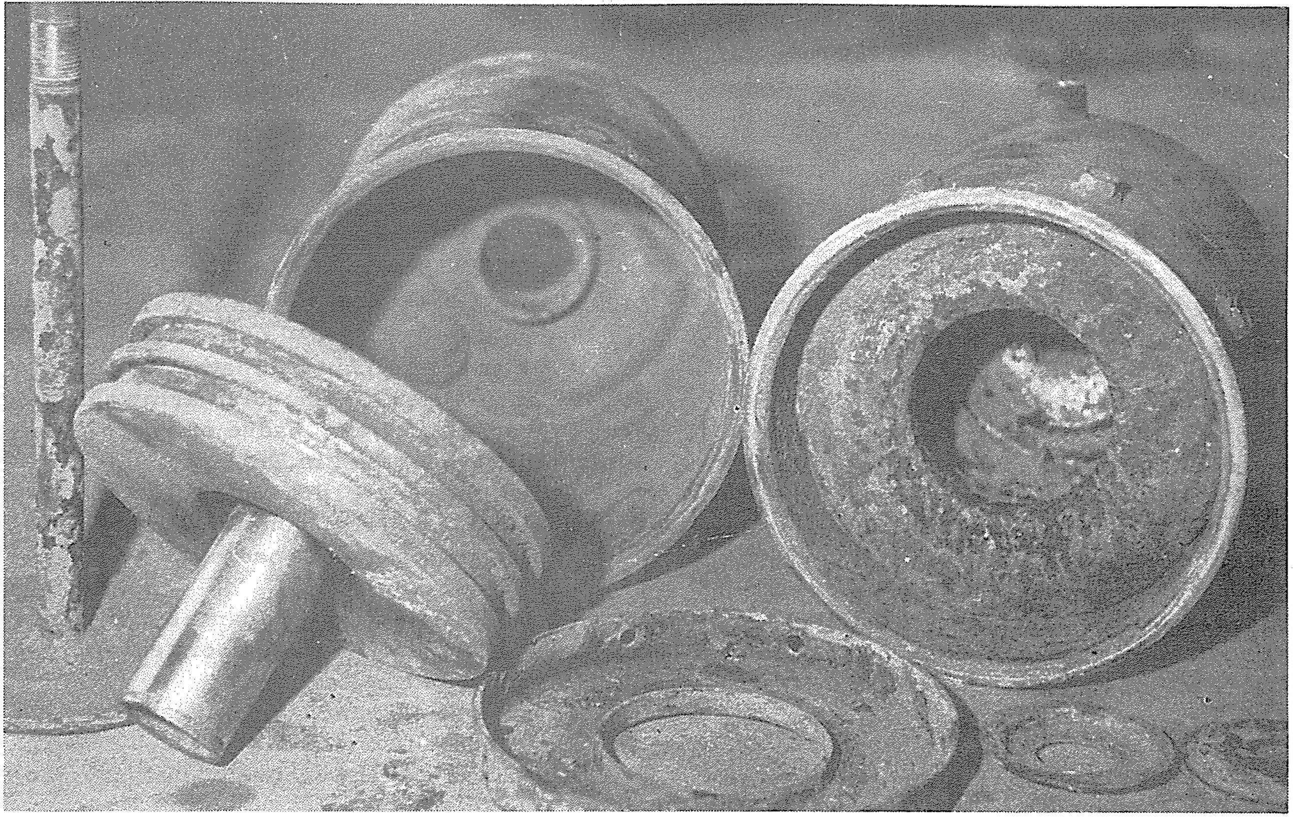
EVERY OPERATOR BELIEVES THAT THE SPRING BRAKE INSTALLATIONS ON HIS VEHICLES WILL PROVIDE STOPPING POWER IN AN EMERGENCY. BUT SOME UNITS ARE SO NEGLECTED THAT WHEN THE DRIVER HITS THE PANIC BUTTON, NOTHING IS GOING TO HAPPEN.

SPRING BRAKES: Don't fit and forget

Canadian operators have been adopting the spring-operated emergency and parking brake system at a steadily rising rate. Now the rate has jumped as major vehicle manufacturers have adopted the system as standard equipment in place of the conventional lever-operated parking brake on full-air vehicles.

That the trend is a good one there seems little doubt. The spring brake provides a high measure of safety. It can give automatic brake actuation in the event of a loss of service brake system pressure on the road; whenever preferable the automatic operation can be displaced by manual operation by the driver. The system also provides fail-safe parking brakes which require a driver to build up air pressure to an adequate level before he can move his vehicle.

But when spring brakes first appeared in any numbers there were some misgivings.



While the value of the system was recognized, it was considered that its adoption might mean vehicles with less braking power than before. Why? Because operators would be lulled into a false sense of security and would reduce the time spent on brake maintenance. It now appears that there was some foresight in this outlook.

INSTALLATIONS NEGLECTED

Some of the makers and distributors of spring brake systems are concerned about the way their installations are neglected by operators. In some cases service instructions call for attention to be given to the spring brake units only once a year. Many units aren't even looked at once in two years.

Perhaps the simplicity of the spring brake installation invites service personnel to overlook it. Whatever the reason, the results of this neglect eventually show up in total failure or serious malfunction.

A thorough checkout of the spring brake system should be part and parcel of regular air brake system overhaul. As the service brake system is frequently given minimal maintenance however, it might pay to ensure that the emergency system at least is in working order.

A major cause of inoperative spring brakes during winter is freezing. Spring brakes in good condition will not freeze, but when they become filled with moisture and wet sludge from the vehicle's air tanks, ice soon forms. When this happens the vehicle has no parking or emergency brakes, even in the event of total air loss.

The remedy is first to ensure that the spring brakes are overhauled in the fall – then to insist that all air tanks are drained daily.

Overhaul requirements for all makes and types of spring brakes are basically similar; disassembly, cleaning, replacement of O-rings and diaphragms and lubrication are called for. The maximum interval allowed by any maker is one year or 100, 000 miles.

Disassembly of most types of spring brake is simple, as long as the unit is removed from the vehicle. Whether they are of the piston or diaphragm type, they have some method of retaining the brake actuating spring during disassembly of the chambers. It is essential that the correct procedure is known and followed before attempting to take the units apart. The actuating spring can be lethal in the event that it is released accidentally.

CLEAN WITH SOLVENT

Several models of spring brake utilize the manual brake release system (usually a threaded device that compresses the spring) to contain the spring assembly during servicing. On some makes compression of the spring can be speeded up by applying shop air to the brake release port, then tightening up on the manual spring compressor.

When the units have been completely disassembled – without separating the spring from its retaining components – all parts should be carefully cleaned in solvent. Piston O-rings and diaphragms should be discarded.

The cylinder walls of piston-type units should be examined for corrosion. In the event that corrosion has pitted the walls, or they are badly scored, the unit will have to be replaced. If corrosion is light, then the surfaces may be cleaned up with abrasive and polished.

Heavy rust on the actuating springs can mean localized stress points which may lead to spring breakage. A light coating of rust is harmless. As a safety measure, remove all loose rust and coat the springs with a corrosion preventive material.

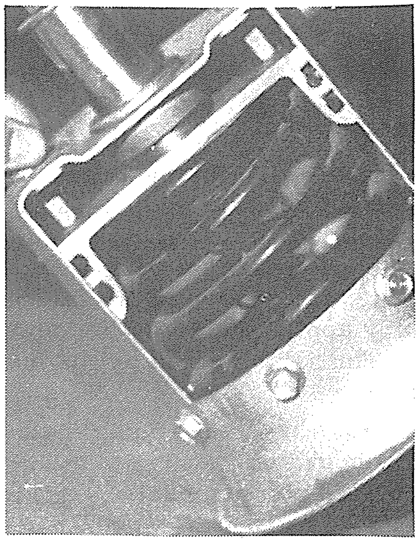
UNIVERSAL LUBRICANT

All areas of the cylinder walls, piston grooves and replacement O-rings should receive a liberal coating of lubricant. An almost universally approved lubricant which stands up to Canadian extremes of climate is Lubriplate Aero, effective down to -70 F. This Aero-grade lubricant should not be confused with other types from the same maker, particularly Lubriplate Low-Temp, which although effective to -60 F, has a different formulation to Aero grade and is not as satisfactory when used in spring brakes.

For Berg spring brakes a special 5% moly grease is the recommended lubricant – standard moly greases have a 3% molybdenum disulphide content.

Whatever lubricant is employed, it should be rubbed thoroughly into all working surface to ensure good adhesion.

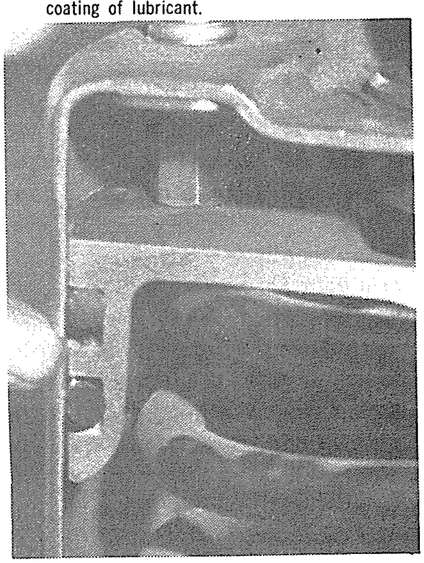
Ensure that the O-rings are completely coated with grease and that their grooves are packed with lubricant. When replacing Maxi-brake O-rings, use the maker's own product



WHEN MAXIBRAKE units have to be installed at odd angles such as this, drain holes have to be drilled in housing. Condensation will accumulate otherwise.

LUBRICANT SHOULD be worked into all appropriate surfaces to ensure that it has maximum adhesion. Berg brake requires special moly grease; for most other makes Aero Lubriplate is recommended.

O-RINGS AND diaphragms should be replaced every time brake unit is serviced. Like rest of components, O-rings should have heavy coating of lubricant.



as nonstandard rings have given trouble in cold-weather operation.

CHECK ON SEALS

During lubrication, close attention should be given to any seals and O-rings operating on the piston shaft or pushrod. Make sure that they are undamaged and that they too are well greased.

Although diaphragms theoretically need no lubrication, in actual practice some chafing has been found to occur where the diaphragm contacts the push plate. It is a sound precaution to apply a thin coat of silicone lubricant at the point of contact. The push plate itself should naturally be smooth and free from pitting and burrs.

Whatever the maintenance interval specified by the spring brake manufacturer, more frequent lubrication is quite likely to be necessary if operating conditions have been exceptionally bad. Danger sign is sluggish brake release at high system pressures.

Another danger sign to watch for is reduced pushrod travel on spring brake application. This can mean a piston that is cocked in its cylinder, or a broken actuating spring.

BRAKE ADJUSTMENT NECESSARY

But regardless of the care with which a spring brake unit is serviced, its efficiency is only as good as the brake it operated. The best spring brake unit will not compensate for lack of adjustment, or wear on camshaft, lining, or drums.

The entire parking emergency brake system needs to be checked out at the same time as the spring brakes themselves are overhauled. Air lines must be examined for damage and leaks. Control and regulating valves should be serviced as called for by the maker's instructions.

IMPROPER INSTALLATION

There is another point which concerns some spring brake makers. Their units are not always being installed properly by fleet shops or even by vehicle manufacturers. One maker cites an instance where a major vehicle builder is currently installing his spring brakes but with air lines of inadequate diameter and with a valve layout that would permit one brake to lock on with the other off.

—Bus and Truck Transport

EFR (continued from page 12)

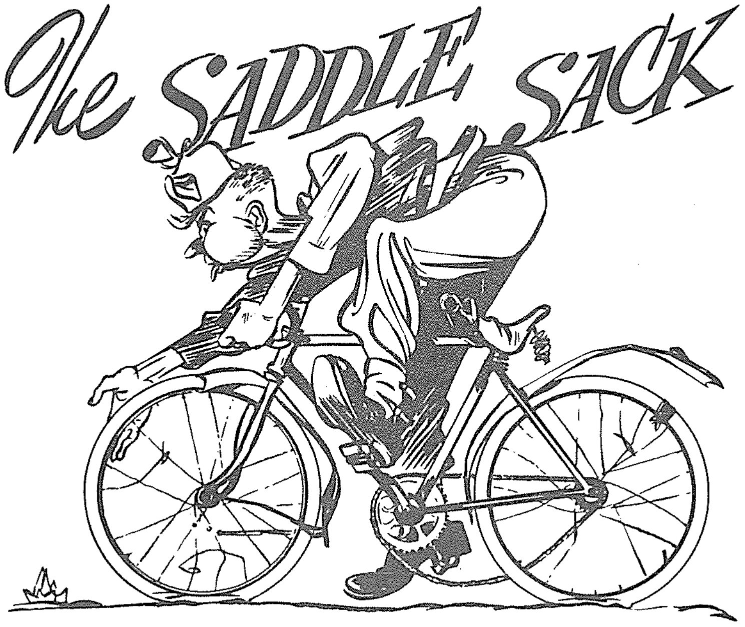
don't hold up the report for a lengthly study but send it in. The guy in Ottawa can write or wire back for specific details if he needs them. Besides, there are no art critics in DEME; speed and ease are more important than beauty for diagrams on the back.

Of course the big problem is how to get the thing out of the Unit. It is like trying to get at that blonde with your wife sitting between you at the bar. You tell the corporal in detail. When he is convinced he takes you to the sergeant and you have to go all through it again; and again with the staff sergeant and again and again. By this time you wonder if it is really worth while. Well, it is - keep plugging. Show your boss this article and see if it will raise in his breast some compassion for the people in the information vacuum at Forces Headquarters. You might even murmer that some day he may be posted there and wind up in the same position.

Then there is the matter of bad answers. Yes I know you have had some frustrating and silly answers from time to time. You probably will in the future, too, but this is partly a matter of viewpoints, partly people doing things in haste; but mostly a result of the information vacuum mentioned away back somewhere in this rambling dissertation. Do not be discouraged; in your service you will get lots of bad answers. The people responsible for these things are not unaware of past sins and are determined to commit as few as possible in the future. Bear with us and start the flow of information that is needed to help keep RCEME on top of the repair job.

CAM

The SADDLE SACK



The British call them "Push Cycles"
"and I see why" says Arm/Sgt. Dement T. Rowdy our S.A. Columnist

LAST week I used an Army bicycle. At the time I am in a hurry and think to save quite a large chunk of the nation's time by using the smart two tone khaki and red velocipede provided for such emergencies.

I soon found that time was to be one of my minor worries.

I start out, gaily singing Beethovens' fifth in B flat minor— (as is my wont when happy) and before I get to the first arpeggio I am consumed in a blind rage. The chain slips off the sprocket every third revolution of the rear wheel; the front wheel's cones are so loose, it uses the forks for guides; the rear cones are tighter'n the paymaster; the fenders rattle like a L/Cpls' head and the handlebars rise and fall at every stroke like the old village pump. To add to my pleasure, both tires have a slow leak and I am left at the halfway point of my journey with about 35 pounds of bicycle to carry...

As bicycles are no longer a problem in the army, we'll spare you the rest of this harrowing tale. You'll find the story in the Directorate of Mechanical Engineering (NDHO) magazine CAM dated July 1945.

Dement T Rowdy is, of course, as all the old old-timers know, Capt HA Rosson, DEME.

-Editor

RCEME CENTRAL COMMAND GOLF TOURNAMENT

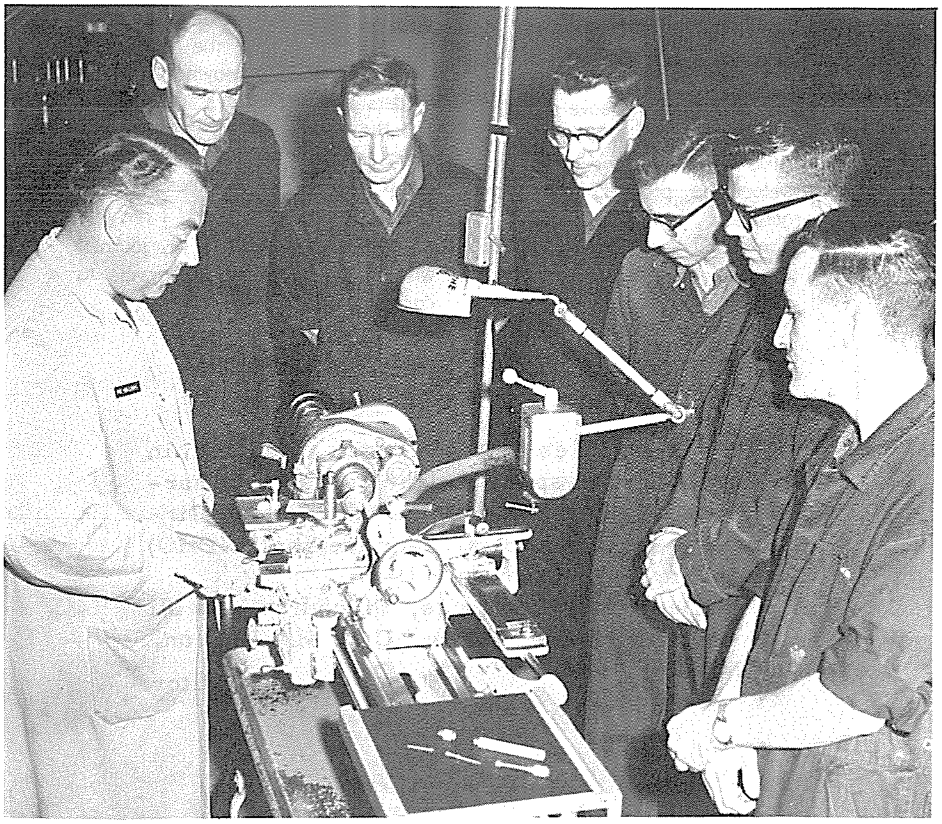
By Maj BM Deibert

On Monday, 14 Sep 64, a golf tournament was held at the Camp Borden Golf Club for all RCEME personnel in Central Command. Forty-six golfers from Camp Borden, Camp Petawawa, Kingston, Lakeview and Oakville gathered for this event which was sponsored by 14 Coy RCEME. A buffet in the club house followed the 18 hole game which commenced at 0900 hours.

The best score was turned in by Lt Code from the RCEME School. With a low gross of 78, he won the "14 Coy RCEME" trophy and a fine pair of golf shoes. S sgt Kutyk from 2 Tpt Coy RCASC Wksp Platoon, with a low gross of 79, carried off the first low net prize consisting of the "Ted Brignell" trophy (donated by the now retired Major EM Brignell) and a good quality putter. Close behind on the winning list were Major Deibert from Camp Borden, WO 2 Orme from Kingston, and two Petawawa entries – Lt Laird and Major Cox. Lt-Col WG Hamilton, the Command EME, presented the two major awards.

The feeling seemed to be unanimous that the tournament was very successful. For most of us it was a day to renew old acquaintenances, and for all it was an opportunity for pleasant comradeship and friendly competition. The weather was ideal and the course in excellent condition. With such choice ingredients, the product just had to be a perfect day for a healthful game of golf.

This was the first such tournament held in Central Command and it is hoped that it will be an annual affair henceforth. 14 Coy RCEME has offered to sponsor the tournament again next year and would welcome any suggestions for improvement. Choosing a suitable date is always a thorny problem. The idea of holding it on the Monday preceding the Central Command Olympics seems to be a good compromise. Being on a Monday, it gives players from remote areas a chance to travel to Camp Borden during the weekend; then, those people who have been selected to play in the Command Olympics can stay on and thus have to make only one trip for the two events. In any case, we hope that the turnout next year will be even bigger, and that all areas in the Command will be represented.

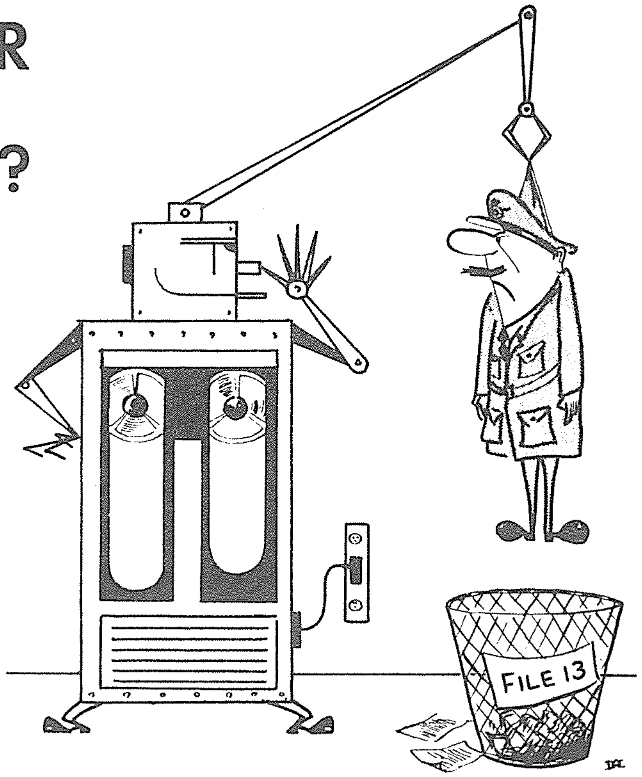


INTEGRATION?

The RCEME School always tries to be of service to the Arms of the Army. From 8 Sep to 2 Oct 64, Artisan Platoon of Armament Company conducted the Machine Shop Familiarization Course for the Royal Canadian Signals Equipment Technician Group 2 personnel, shown in the picture. This is the first known instance of inter-corps training of this type. The instructors were Douglas Williams and Walter Riley. Mr. Williams originated a new project for this class which can be seen in pieces in the foreground. It is a center punch with interchangeable tips and a built-in spring-loaded hammer.

MACHINES OR INSTRUCTORS?

By S/L WH Farrell, RCAF
in ROUNDEL



The Tech Bulletin carried its first article on programmed instruction in the April edition.

The purpose of that article was to introduce the TEMAC programmed learning material which is now being used for pre-group 4 assessment study purposes.

It was proposed to follow this first article with another in this edition which would discuss programmed instruction in more detail.

The following article, which is reprinted from the Sep 64 edition of ROUNDEL, is very similar to our proposed article.

The RCAF Radar and Communications School (R & CS) at RCAF Station Clinton has done considerable work on programmed instruction including the production of their own programs for mathematics and basic electronics.

S/L Farrell, the author of this article and a member of the RCAF's education branch was responsible for R & CS's original research in programmed instruction.

-Editor

A teaching technique, variously termed programmed instruction, programmed learning, automated teaching or the teaching machine, is the latest innovation in the educational field. Many are wondering what influence this new pedagogical method will have on RCAF training. Can machines replace instructors? Could we really teach without teachers? Is the instructor's career threatened by the new pedagogy?

First let us be clear on one point. The machine itself, either a complicated mechanism or a simple special type of book, does not teach. Rather, the program (that material which is fed into the machine or is incorporated in the book) does the teaching - and judging from results thus far, most effectively. It is also important to understand that there are two major (linear and branching) and two minor (mathematics and adjuncting) methods of "programming", the term given to the art of arranging the material in the proper sequence and format. A short description of the two major methods is presented in this article.

Deeply rooted in behavioural phychology is the linear programming method developed by Dr. B.F. Skinner of Harvard University. In the linear format the information to be learned is presented in very small portions or steps, termed "frames". After each frame the student is required to make a response, answer a question or supply a word which reinforces his learning of the particular point being explained in that segment. He then turns the page (in the book-type) or presses a lever or pushes a button (in the machine-type) and the correct response is revealed. The key to effective learning in the linear method is active participation at each step, the immediate knowledge

Example of R & CS Programmed Instruction (Linear Method)

	The same principle applies to equations. Subtraction of an equal quantity from both sides of an equation, as indicated by the examples with the scales, (does/does not) ________ ________ unbalance the equation.
Does not	**If $a = bc$ and we subtract 10 from each side, we get $a - 10 = bc - 10$ where one side (is/is not) ________ equal to the other.**
Is	**If we subtract 8 from each side of $v = at$, we obtain $v - 8 =$ ________ where one side equals the other.**
$at - 8$	**$r + 16 = st$. If we subtract 16 from each side we get ________ as the equation.**
$r = st - 16$	**$A + 16 = bc$ is changed to $A = bc - 16$. We have subtracted ________ from both sides.**
16	**If we add 7 to both sides of the equation $R = st + 16$ we get ________.**
$R + 7 =$ $st + 23$	**If we subtract 2 from both sides of the equation $z = xy + 10$ we get ________.**
$z - 2 =$ $xy + 8$	**In order to obtain $v + 16 = jL$ we had to subtract ________ from both sides of $v + 18 = jL + 2$.**
2	**Any equal quantity, letter or number, can be ________ from or ________ to both sides of a relationship (equation) without changing its equality.**

of results, constant reinforcement and the small, carefully written segments of material. The writing of the frames to call forth or "elicit" the correct response and thus "shape the behaviour" of the students is obviously a very difficult task, combining superior grasp of the subject material and an understanding of the phychology of learning.

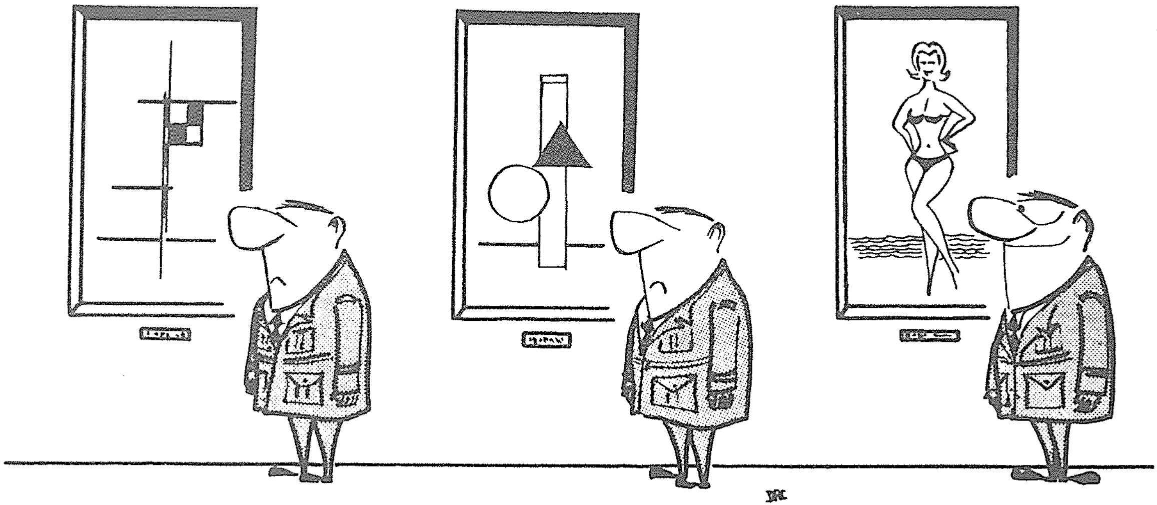
The format is best illustrated in the accompanying example, taken from a program constructed at the Radar and Communications School (R & CS), RCAF Stn. Clinton. Although, for illustrative purposes, this shows the "answer" to a frame at the left margin of the next frame on the same page, in actual practice the answers are on the left margin of the succeeding page and are viewed after the student's answer is written on a separate sheet of paper.

When a machine is used the written answers of the students become visible (but unattainable) under a glass cover at the same time as the correct answer is revealed. Utilizing this machine-type presentation prevents any "cheating" on the part of the students. It is in this context that the term "teaching machine" is used as a synonym for programmed instruction.

The alternative method of presentation is that developed by Dr. N. A. Crowder of U.S. Industries and is termed intrinsic programming or, more popular, "branching". With Dr. Crowder's system the material is presented in larger segments than in the linear method, with each section being followed by a multiple-choice question. The student's selection of the answers to the question posed after any one segment determines which page in the book he turns to next. If he chooses the correct answer he is so informed and is presented with new information. If incorrect, the student is informed of the nature of his error on the page to which he is referred and given additional information. He is then instructed to attempt the original question again. When he is finally led to the correct solution, and not before, the student proceeds to the new material.

Since the pages are not read in numerical sequence but in accord with each individual's progress, these texts have been termed "scrambled books". (Those copyrighted by Dr. Crowder are called "Tutor-Texts"). The fact that each student will have a different sequence of progression and will learn from the program according to his individual mastery of the subject makes the program intrinsic in nature. Utilizing the more sophisticated (and very expensive) machine methodology, different slides are presented in response to the various answers to the multiple-choice questions as opposed to the various pages in the "scrambled books". Automatic scoring and prevention of "cheating" are the distinctive features of the machine (called Auto-Tutors). These unproven advantages are heavily outweighed by the lower cost of the just-as-effective scrambled books, developed and used by R & CS for RCAF trainees at Clinton.

The key to effective learning with intrinsic programming is active participation, immediate knowledge of results, and "no progression without understanding". As with linear programming, branching is completely self-pacing and self-motivating; of very great importance is the fact that under both presentations the material to be learned is programmed by ex-



"After each frame the student is required to make a response."

perts for maximum learning potential. Each student is, in effect, being taught individually by an expert. Equally important is the fact that the tutor is tireless and has infinite patience. The slow students can read a segment as often as they wish until it is mastered and they know they have mastered it. The fast students are not held back and are not so likely to become bored. Speed is rewarded with faster mastery and new challenges. Learning becomes the adventure it should be.

After this brief explanation of the two major programmed instruction methods, let us return to the question inferred in the title of this article. Does the programmed instruction movement really pose the question, machines or instructors? The answer is no! Both instructors and programs have a valuable position in the teaching process. It is true, however, that if programmed instruction were to be introduced on a large scale, the role of the instructor would be changed. Whereas large amounts of the hard-core material in any subject would be presented through the medium of programs, the instructors would lead discussions, explain the further applications of the subject, guide the students and stimulate them to further effort. The instructor is visualized as a consultant and guide rather than as a teacher of rote material. In actual fact, the teacher would have to be a better one to cope with this new role.

Now for the $64.00 question. Should we adopt programmed instruction in the RCAF? Although preliminary results, civilian and military are most favourable (in some instances spectacular) we are still undecided. The only service in the world (as far as is known) which has made the decision to introduce programmed instruction on a large scale is the USAF. This decision is based on the results of research recently completed in some of its schools which revealed performance in less time using programmed instruction.

The RCAF has been in the forefront in the experimental work in programmed instruction in North America. At the same time that the USAF started its research into programmed instruction, the R & CS at Clinton did likewise. Chronologically, the first experiment at Clinton utilizing "scrambled books" in electronics paralleled a similar one at Keesler AFB using the Auto-Tutor in the same subject. The major conclusion of these first experiments was that students could learn from the programs alone with virtually no assistance from the instructor (although as it has been previously noted, under normal circumstances the instructors would be required to assist the students).

A second experiment at R & CS confirmed the view that programmed instruction was an excellent medium for self-pacing. While some students took longer than the allotted time, several finished the programmed material (and all lab periods) in half the normal time and achieved above-average results. Of major importance was the fact that the "ceased training" rate for the experimental group was approximately one-half that of the total student population.

Preliminary work in elementary mathematics indicates that much can be learned without employing any instructors. All students awaiting courses at R & CS, who would otherwise be having no academic refresher training, are reviewing their mathematics in this manner with one supervisor for as many as 200 at one time. To see these students eagerly at work without a word being spoken is a sight to behold! The results show that, for a total of 12 hours work on fractions, decimals, squares/square root, powers of ten, logarithms, equations, and ratio and proportion, the pre-test average of 46-48% has risen to 68-70% on post-test. No instructors were employed and no homework permitted during this program. Although much of the work was "review", for many of the students some of the topics, e. g., logarithms and powers of ten, were completely new material. The implications for home study and on-the-job training are obvious.

For those readers stimulated by this article or interested in trying some programmed instruction for themselves, there are some excellent programs on the market. The subjects range from elementary arithmetic to calculus and from contract bridge to basic English. The best method of learning to understand programmed instruction is to try a program on a subject you previously considered beyond your scope. You will be amazed at how clever you are if you follow directions faithfully! The Doubleday series of Tutor - Texts, the TEMAC series in mathematics and languages, and Harcourt, Brace-World's English 2600 are all excellent publications.

The RCAF is definitely interested in the field, has completed important basic research and is keeping a very close watch on all developments, including the use of computers in programming. An automated assistant may be closer than you think!

TECHNICAL TEASERS

The Truck in the Desert

A heavy tank transporter reaches the edge of a desert 400 miles wide. The vehicle averages only one mile to the gallon of gas, and the total available gasoline tank capacity, including extra cans, is 180 gallons, so it is apparent that gasoline dumps will have to be established in the desert. There is ample gas to be had at the desert edge. With wise planning of the operation what is the least gas consumption necessary to get the vehicle across the desert?

Gears in the Arctic

In a remote outpost in the Canadian Arctic a RCEME repair detachment required a 6 to 1 reduction gear to run a water pump supplying the local still. A box left by another group was found to contain a dozen gears strong enough for even half their width – the only trouble was that they were all alike. The OC cursed; the corporal stepped up and sketched the way to do it. What was the corporal's plan? This problem requires no elaborate 'gearology' or engineering but does call for some imagination. Welding equipment and frame material is available.

Answers on page 38.

OKTOBERFEST

Merrymakers who converged on Munich for the famous Oktoberfest this year set a record for beer consumption, according to a spokesman for the city.

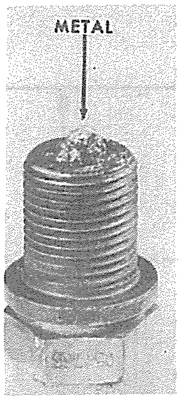
An associate Press despatch states that "the thousands of West German and foreign tourists who sat in the beer tents of Munich swilled down a total of 839,811.5 gallons of beer during the two-week drinking marathon."

It is said that the revellers also consumed 308,358 broiled chickens.

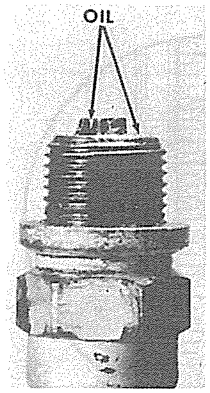
CHUCKLE

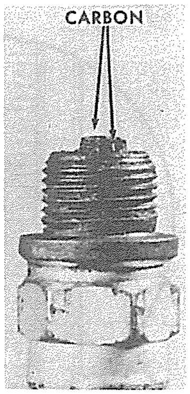
The baseball manager discovered a trick horse who could hit the ball a mile. It was the championship game, the last of the ninth with two out and the score tied. He put the nag in as a pinch hitter. The horse swung on the first pitch and knocked it out of sight. Then it just stood at home plate. "Run!" cried the manager, "run!".

"Don't be crazy", replied the nag. "If I could run I'd be at Santa Anita today!"



Spark! or S-p-u-t-t-e-r





SPARK PLUG fouling is often due simply to low-power ground operations. But, it pays to check all fouled plugs closely, because fouling can be caused by severe engine trouble. And, the plug's condition can usually tell you what the trouble is.

For example, heavily fouled plugs can be a warning of piston failure. When pistons start to fail, they often cause small amounts of molten metal to spray onto the plug nose. These deposits frequently short out the plug and allow oil deposits to accumulate. So, if plugs are abnormally oil-fouled and show evidence of metal spray, be sure to check the combustion chamber for piston condition.

Fouled plugs can also alert you to the presence of small loose parts in the combustion chamber. Such parts bounce around and often travel from one cylinder to another through exhaust and intake ports. These objects can cause serious engine damage. And they often damage spark plug electrodes as well. If you find an oil-fouled plug with a damaged electrode, always check the combustion chamber carefully for foreign objects.

When tracking down engine troubles, be sure to follow all steps listed in your company's "Operations and Maintenance" manual or engine manufacturer's instruction manual.

Champion Spark Plug Company
Toledo 1, Ohio

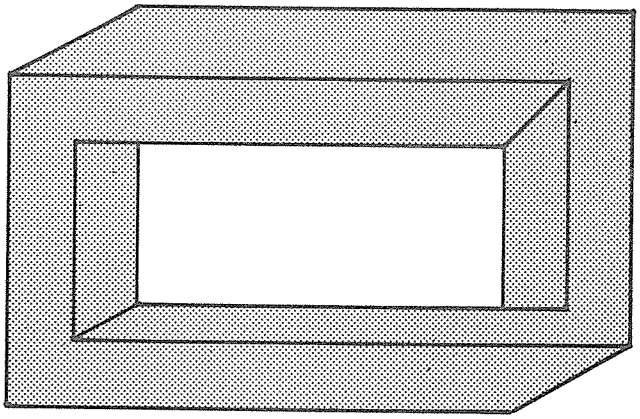
BRITAIN MAKES HISTORY WITH PURCHASE

Britain is to buy 50 of a newly-developed German mobile military bridge-cum-ferry amphibian for about 30 million marks (approximately $7,600,000 Canadian), the Defence Ministry in Bonn has announced.

The order, the first major military purchase by Britain since the Napoleonic War, has been placed after exhaustive testing of the prototype manufactured by a consortium of German firms.

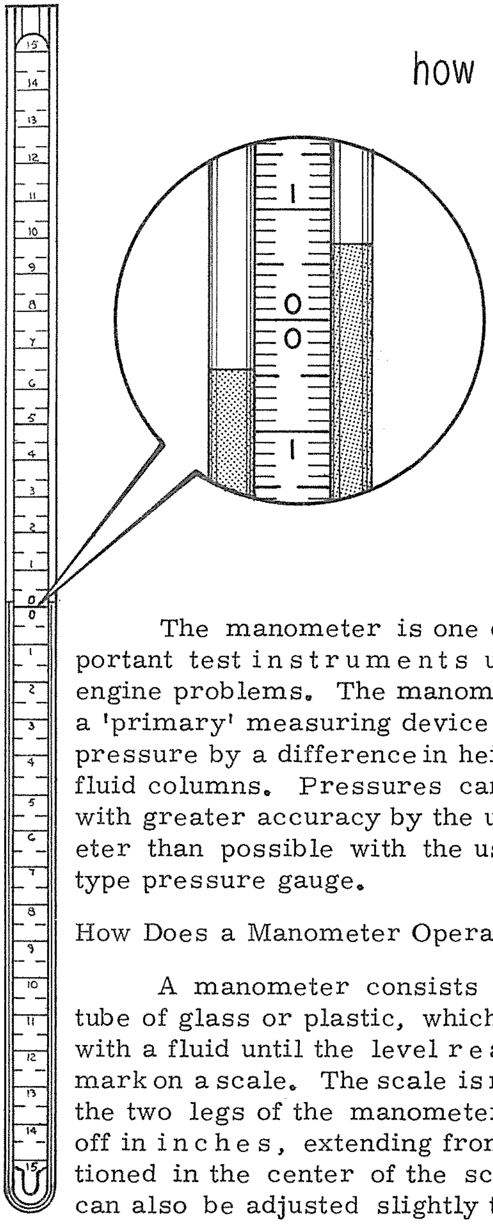
The 20-ton vehicle, which has an all-wheel drive, is 30 ft long, 10 ft wide and 12 ft high. It can equal the cross-country performance of a heavy military lorry with a speed of nearly 40 miles an hour and be used in a series for bridging rivers. The first will be ready for delivery this year.

— From the Federal German Press Office



The single-phase to three-phase transformer pictured on page 28 of the July 64 RCEME Technical Bulletin looked so useful but so delicate, we thought it should have a protective covering, so we sent our experts to find a suitable cover for it. This they did — in "Popular Science" — and it is reproduced above.

how to use the MANOMETER

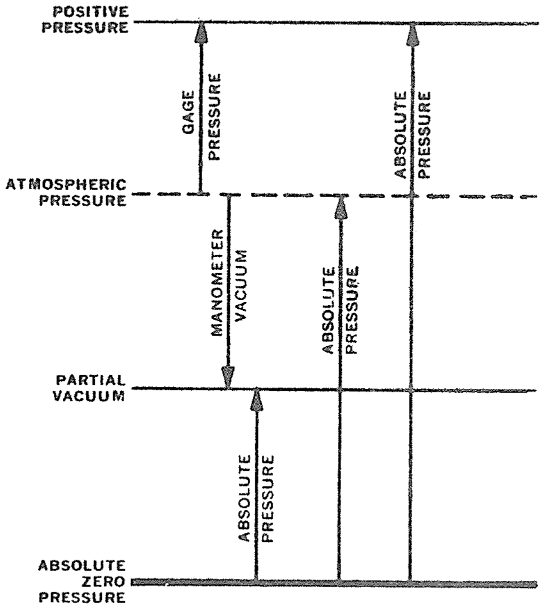


The manometer is one of the most important test instruments used to diagnose engine problems. The manometer is known as a 'primary' measuring device which indicates pressure by a difference in height between two fluid columns. Pressures can be determined with greater accuracy by the use of a manometer than possible with the usual mechanical type pressure gauge.

How Does a Manometer Operate?

A manometer consists of a 'U' shaped tube of glass or plastic, which has been filled with a fluid until the level reaches the zero mark on a scale. The scale is mounted between the two legs of the manometer and is marked off in inches, extending from the zero positioned in the center of the scale. The scale can also be adjusted slightly to align with the height of the fluid.

One leg of the 'U' shaped tube is connected to the pressure or vacuum to be read. The other leg is usually permitted to vent to the atmosphere. A pressure, or a vacuum, causes the fluid to be displaced. The height of the total displacement is read to determine the pressure or vacuum. Thus, if the liquid is forced up one leg of the manometer 1 1/2 inches it will be forced down the other an equal amount, 1 1/2 inches. The pressure is equal to 3 inches which is the total height between the liquid columns. The 'Engine Operating Condition Charts' list the engine pressures and vacuums in the fluid, mercury or water, used in the appropriate manometer.



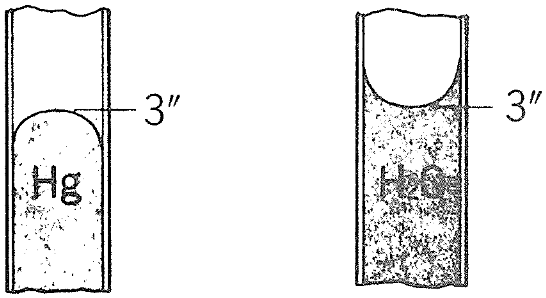
Pressure Absolute = Pressure above Absolute Zero

Pressure Gage = Gage Pressure + Atmospheric Pressure

Pressure Vacuum = Vacuum Pressure − Atmospheric Pressure

RELATIONS OF PRESSURE CHART

PRESSURE CONVERSION CHART		
1" water	=	.0735" mercury
1" water	=	.0361 p.s.i.
1" mercury	=	.491 p.s.i.
1" mercury	=	13.6" water
1 p.s.i.	=	27.7" water
1 p.s.i.	=	2.036" mercury



TOP SURFACE OF FLUIDS

CONVEX FOR MERCURY

CONCAVE FOR WATER

How to Read a Manometer with Accuracy

The height of a column of mercury is read differently than that of a column of water. Mercury does not wet the inside surface; therefore, the top of the column has a convex meniscus (shape). Water wets the surface and therefore has a concave meniscus. A mercury column is read by sighting horizontally between the top of the convex mercury surface and the scale, see example. A water manometer is read by sighting horizontally between the bottom of the concave water surface and the scale.

Pressure Conversions

Sometimes it is desired to convert inches-of-water to inches-of-mercury or to pounds-per-square-inch pressure. The 'Pressure Conversion Chart' gives the values required to convert a particular reading into another unit of measurement.

Example: What is 3 inches of mercury equal to in pounds per square inch and in inches of water

3" mercury x .491 psi = 1.473 psi
3" mercury x 13.6" water = 40.8" water

As can be seen 3" mercury = 1.473 psi = 40.8" water.

Pressures and Vacuums

A manometer can be used to measure both pressures and vacuums. The pressure causes the fluid to be forced up the leg of the tube that is vented to the atmosphere. A vacuum permits atmospheric pressure to force the fluid up the leg having the hose connected to the point of vacuum.

When working with pressure gauges and manometers a review of what these tools actually register is in order.

'Relations of Pressure Chart' illustrates the following points:

"What is a vacuum?" An absolute vacuum (which does not exist anywhere on earth) is the absence of all gaseous material (air) from a space, which would result in an absolute pressure of zero. The vacuum referred to when reading a manometer or gauge is a partial vacuum.

"What is a pressure?" Pressure is the force a substance exerts. Air exerts a pressure known as atmospheric pressure (weight) caused by the gravitational pull of the earth. The accepted atmospheric pressure of air at sea level is 14.7 psi. A barometer registers the atmospheric pressure of air. The fluctuations of a barometer day-to-day shows that the atmospheric pressure changes. The accepted sea level pressure of air is equal to 30 inches mercury approximately (29.92 inches mercury).

"What is gauge pressure?" The pressure shown on a pressure gauge or on a manometer is the pressure above the existing atmospheric pressure.

"What is the vacuum shown on a gauge or on a manometer?" The vacuum registered is the reduction in pressure below the existing atmospheric pressure.

When using a manometer should one fluid column travel further than the other column, due to minor variations in the internal diameter of the tube or to pressures imposed, the accuracy of the pressure reading thus obtained is not impaired. The fact that one column travels further than the other does not affect the accuracy of the reading.

When using a pressure gauge or a manometer to determine a pressure or vacuum while diagnosing an engine problem, time should be taken to review the fundamentals to be assured of an accurate evaluation.

DMT VISITS SCHOOL

Brigadier GA Turcot CD, Director General of Military Training, (now Major General and GOC Eascom) examines ignition firing system of Centurion tank. On the left is Major DJ Tremeer British Exchange Officer, OC Vehicle Company the RCEME School. On the right is Ssgt PS Hudson, master vehicle technician, who is explaining the operation of the complex magneto-fired twin ignition system.

- Photo by Thomas

WHETHER YOU CALL IT
NETWORK ANALYSIS
or
ARROW DIAGRAMING, HERE'S

How to run a Great Train Robbery

The increasing sophistication of master criminals is said to have been helped by the popularity of films about elaborately-planned robberies. But soon they will be queueing not outside cinemas but outside bookshops – to buy a scholarly volume* about the latest method of business planning.

The book, written by a senior lecturer in management science at the College of Aeronautics, Cranfield, has a discussion of how 'network analysis' could be applied to large-scale crime. It takes as its model a hold-up similar to the Great Train Robbery.

Network analysis (described in Insight, August 25, 1963) was originally developed in America to speed up the Polaris program, and its use is rapidly catching on in the planning of other big projects. It involves drawing a diagram to show relationship between various jobs. The arrows on the diagram represent 'activities'. The blobs represent 'events' (the stages at which one or more activities must be completed before the next can start). Dotted arrows indicate that the event at the head must follow the event at the tail though no actual activity is involved. Where a job does not have to be completed before a related job starts, a lag or lead is marked.

There are a number of paths through the network in the direction of the arrows, and the one with the longest total time is called the 'critical path'. Particular attention has to be paid to the critical path, as any delays along it must affect the whole program. There is a certain amount of leeway in the timing of jobs not on the critical path. (In the diagram, the critical path has been calculated for Phase 1, and estimated for Phase 2, and is marked with thick arrows).

The train robbery analysis is based on the assumption that several 'front' businesses, such as amusement arcades, had to be established to provide outlets for the money. If so, it is this that would have determined the critical path time for Phase 1, and the planners would have had to watch the jobs making it up very carefully.

The author of the book, Mr A Battersby, thinks network analysis has more use in preventing crime than planning it. "A good way of prevention", he says, "is for the potential victim to plan a crime against himself, and then to examine it for weaknesses. I once did this myself when I was managing a factory, and it led to our introducing several new security measures. Network analysis helps by indicating the critical jobs against which preventive measures might be concentrated".

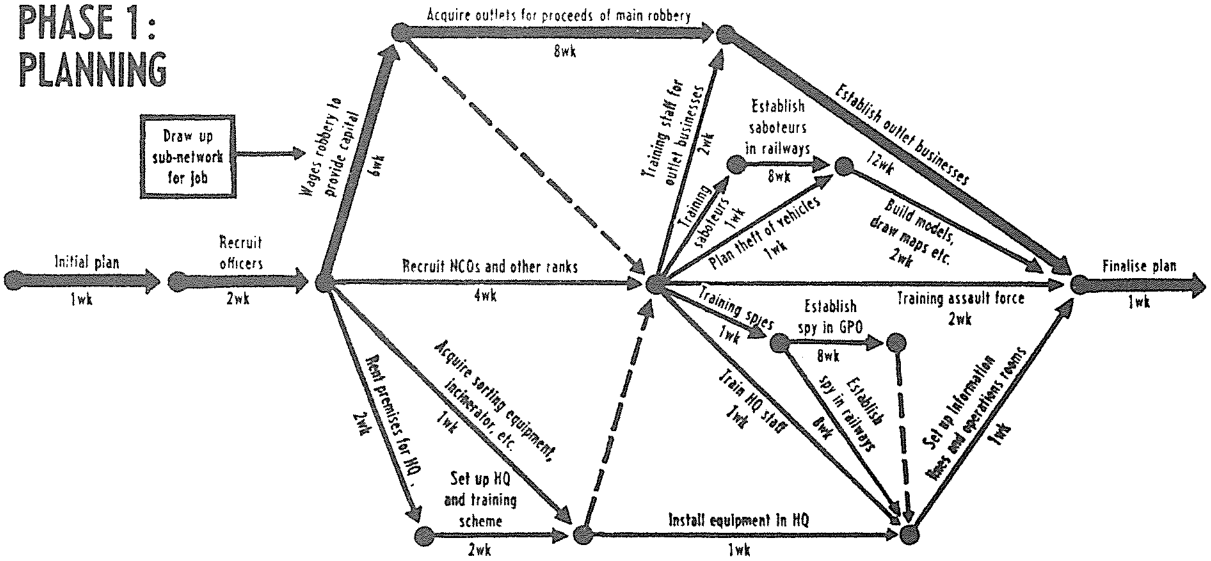
Has network analysis ever been used in planning a real crime? "Not as far as we know", say Scotland Yard, but some crimes are becoming more and more like complicated business operations.

One difficulty facing a criminal network analyst would be that a really elaborate network – such as that used for Polaris – needs to be handled by a computer. So if a computer ever disappears in mysterious circumstances the police will have to watch out: the underworld may be planning the biggest coup ever.

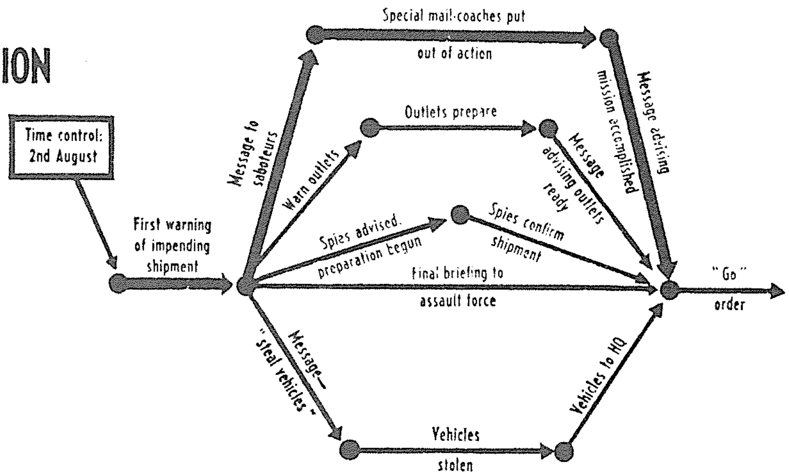
* "Network Analysis for Planning and Scheduling" published by MacMillan, 42s.

-The Sunday Times (London)

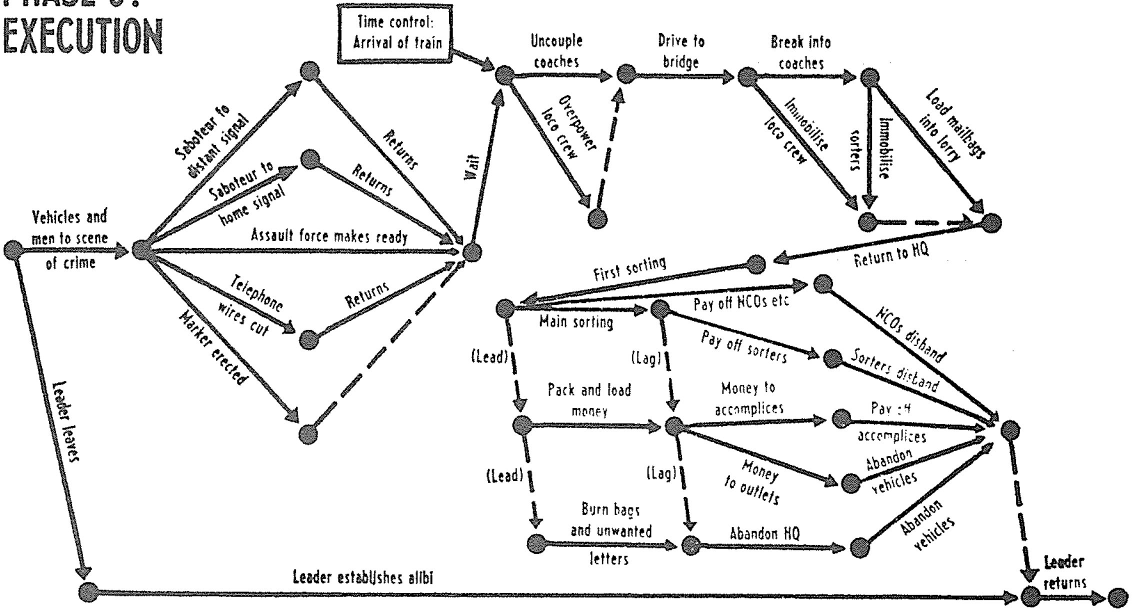
PHASE 1: PLANNING


Draw up sub-network for job
Initial plan
1wk
Recruit officers
2wk
Wages robbery to provide capital
6wk
Acquire outlets for proceeds of main robbery
8wk
Recruit NCOs and other ranks
4wk
Rent premises for HQ
2wk
Acquire sorting equipment, incinerator, etc.
1wk
Set up HQ and training scheme
2wk
Install equipment in HQ
1wk
Training staff for outlet businesses
2wk
Training saboteurs
1wk
Establish saboteurs in railways
8wk
Plan theft of vehicles
1wk
Establish outlet businesses
12wk
Build models, draw maps etc.
2wk
Training assault force
2wk
Training spies
1wk
Establish spy in GPO
8wk
Establish spy in railways
8wk
Train HQ staff
1wk
Set up information lines and operations rooms
1wk
Finalise plan
1wk

PHASE 2: PREPARATION


Time control: 2nd August
First warning of impending shipment
Message to saboteurs
Special mail-coaches put out of action
Message advising mission accomplished
Warn outlets
Outlets prepare
Message advising outlets ready
Spies advised, preparation begun
Spies confirm shipment
Final briefing to assault force
"Go" order
Message—"steal vehicles"
Vehicles stolen
Vehicles to HQ

PHASE 3: EXECUTION



Technical Notes

The following technical notes, consisting entirely of General Motors of Canada Products Service Bulletins, are put in as back pages which may be removed for easy reference, if desired.

FRONT SUSPENSION UPPER AND LOWER CONTROL ARM INNER CROSS SHAFT RETAINING BOLT TORQUE - 1964 Series 1000 All - Cars

This Bulletin item has been issued to stress the importance of checking the upper and lower control arm bushing retaining bolt torque at the time of the new car inspection.

The lower control arm cross shaft bushing retaining bolts should be torqued 45 to 55 ft. lbs.
The upper control arm cross shaft bushing retaining bolts should be torqued 35 to 40 ft. lbs.

Note: - Bounce front end of vehicle to centralize the bushings prior to torque check. The weight of the vehicle must be on the wheels when torque is being checked.

EXHAUST MANIFOLD GASKET LEAKING AND BURNING - 1963-64 Series 1000 With 230 L6 Engine - Cars

To correct the above condition, a change was made near the end of 1964 Production to use the Truck engine manifold gasket, part #3826261, on the above models. This gasket should be installed to correct repeat gasket failures and has been released for passenger car engines replacing gasket, part #3824438.

COMPRESSION RATIOS AND OCTANE REQUIREMENTS - 1964 Chevrolet Series 1000 - Cars

Listed in the following are the compression ratios and octane (Research) requirements of the above 1964 passenger car engines. Notes following the chart supply this information needed to modify certain domestic high-compression engines so that they will be compatible with lower octane fuel.

Engine Displacement	Compression Ratio	Octane Requirement	Export Conversion
153	8.5	91-93	
	7.5	85-87	Note 1

Engine Displacement	Compression Ratio	Octane Requirement	Export Conversion
164	8.25	91-93	Note 2
	9.25	96-98	None
	8.25	98-100	None (Monza Spyder)
	7.25	80-83	
194	8.5	91-93	Note 3
	7.5	85-87	
230	8.5	91-93	Note 4
	7.0	79-81	4° BTDC
	7.0	74-76	0° TDC
283	9.25	91-93	Note 5
	9.0	91-93	Note 5
	8.5	89-91	Note 5
	7.64	84-86	
327	11.0	100-102	None (Corvette fuel injection)
	10.5	99-101	None
409	11.0	100-102	None
	10.0	99-101	None

Note 1: Convert to export (7.5) ratio by installing two cylinder head gaskets, part #3788520.

Note 2: Convert to export (7.25) ratio by replacing domestic pistons, part #3847843, with export pistons, part #3847854.

Note 3: Convert to export (7.5) ratio by replacing domestic cylinder head, part #3793570, with export head, part #3794084.

Note 4: Convert to export (7.0) ratio by replacing domestic pistons and distributor with export pistons, part #38411.8, and distributor, part #1110307.

Note 5: Convert to export (7.64) ratio by replacing domestic cylinder heads with export heads, part #3817682.

USE OF PROPER LUBRICANT FOR INITIAL LUBRICATION OF NEW VALVE TRAIN COMPONENTS ESSENTIAL TO PREVENT SCUFFING AND WEAR - All Series 1000 - Cars and all Truck Series 10 to 80

When installing new partial engines, camshafts, valve lifters, rocker arms and balls, it is essential that the valve train parts be properly lubricated at the time of installation to prevent scuffing and rapid wear during break-in. It is therefore recommended that the valve train components be lubricated with Molybdenum Disulfide during assembly as covered in the following:

Camshaft -

Coat the cam lobes, including lobes on new shafts supplied with partial engine.

Valve Lifters -

Coat the foot of the lifter (lobe contact surface).

Rocker Arms and Balls -

Coat the ball, or the ball contact area in the arm, and the rocker arm pad.

Note:- It is also recommended that Molybdenum Disulfide lubricant be applied when original lifters, rocker arms and rocker balls have been cleaned up and are being re-used.

Molybdenum Disulfide lubricant has been released in a two-ounce tube as a service item and can be obtained from the Parts Department under part #5727550.

Note:- The engine oil should be changed when hydraulic valve lifters are removed for overhaul or replacement. This could prevent repeat noise complaints due to dirt or foreign material in the oil.

DOOR LOCK INSIDE REMOTE CONTROL - 1964 Chevrolet Truck Series 10-80

Further to the item issued on Page 3 of the 1964 Product Service Bulletin, this Section, dealing with Doors Locking Involuntarily When Slammed, some reports have been received stating that even with the new remote control, part #3860601 and #3860602, the condition still exists.

Investigation has revealed that some of the latest remote controls were being received with the detent spring, which controls the effort required to pass from the lock position to the unlock position, being too weak.

To correct this, the detent spring effort must be increased by the installation of a stop adjacent to the spring.

This may be accomplished as follows:

1. Remove the inside handles and inner panel cover.

2. Remove the remote control assembly from the door inner panel.

3. At location "A" in Fig 6, drill a 1/8" hole through the existing slot in the backing plate of the remote control.

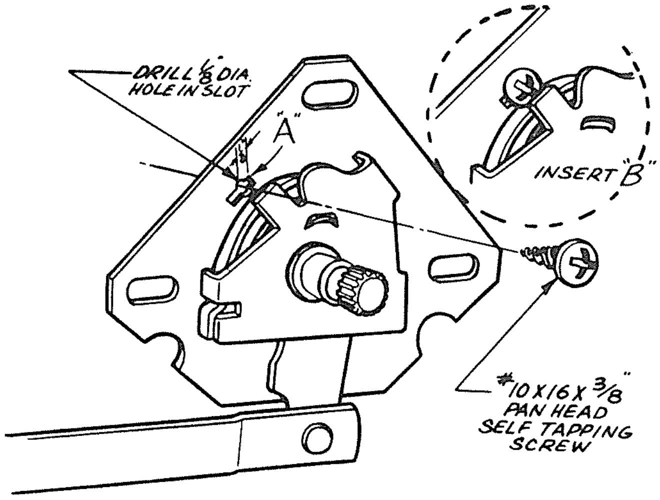

DRILL 1/8" DIA. HOLE IN SLOT
"A"
INSERT "B"
#10 X 16 X 3/8" PAN HEAD SELF TAPPING SCREW

Fig. 6.

4. Using a #10 x 16 x 3/8" pan head self-tapping screw (standard stock part #5785257), insert it in the hole and tighten it against the backing plate so that the side of the head bears against the top or flat surface of the detent spring, as shown in Insert B, Fig. 6. This will assist the spring in controlling the movement of the control arm when it is moved from the unlocked to the locked position.

5. File off the protruding end of the screw on the reverse side of the backing plate.

6. Install the remote control and adjust it in the full forward position.

7. Re-install the previously removed parts.

IGNITION COILS REPLACED IN THE FIELD FOR NO APPARENT REASON - 1963-64 Series 1000 - Cars

A large number of ignition coils are being returned from the Field and reported as defective. On testing these coils, it was found that fifty percent tested okay and should not have been replaced. A number of these coils have been installed on vehicles and no failures have been experienced to date.

When ignition system problems are encountered, the coil should be tested, both hot and cold, and only replaced when the test proves the coil defective.

HEATER BLOWER MOTOR REPLACEMENT REVISED - 1964 Series 1000 - Cars

This item provides a revised service procedure that will facilitate replacement of the heater blower motor on 1964 Chevelle and Chevrolet series passenger cars. The new method presented here should be used in place of the service procedure detailed for this operation on Page 15-57 of the Chevelle Shop Manual, and on Page 15-45 of the Chevrolet Shop Manual.

Blower Motor Replacement

1. Disconnect battery ground cable.
2. Unclip heater hoses from fender skirt.
3. Disconnect the blower motor electrical feed wire at the motor.
4. Move the vehicle front wheels to the extreme right turn position.
5. Remove all bolts retaining the right fender skirt. Allow the skirt to drop and rest on top of the tire.

   To gain maximum clearance for access to the blower motor attaching bolts, a block of wood may be wedged between the fender lower flange and the top of the fender skirt. Position the wood block so that the rear portion of the skirt will be forced down and inboard.
6. Remove the screws attaching the blower motor mounting plate to the air inlet housing. Slide the blower assembly and mounting plate from the air inlet housing.
7. Remove the nut attaching the blower cage to the motor shaft.
8. Re-install the blower motor assembly by performing the above steps in reverse order.

DIRECTIONAL SIGNAL SWITCH MAINTENANCE - 1964 Series 1000 - Cars

This item is issued in order to provide information regarding operation, diagnosis and service of the Guide Lamp manufactured plastic directional signal switch.

Switch Maintenance Operations

Complete removal and replacement of the directional switch and harness is covered in the respective Shop Manuals.

If, from diagnosis of the complaint, it is decided that the switch can be repaired by changing either the actuating plate or the contactors, the following procedure can be used rather than removing the entire switch assembly.

1. Remove the steering wheel, as outlined in the applicable Shop Manual.
2. Remove the transmission selector lever, on column mounted units.
3. On Chevelle and F-85 models, remove retainer, spring and cancelling cam.
4. Remove the directional signal operating lever.
5. Remove the three switch hold down screws.
6. Slide the upper mast housing downward on the mast jacket.
7. By separating the switch and switch housing (often it is necessary to pull additional wiring harness upward), it is possible to remove the actuating plate retaining screw. An offset cross recess screwdriver or similar reduced length tool is required for this operation.
8. With the screw removed (Step 7) the actuating plate can be lifted out of the switch.

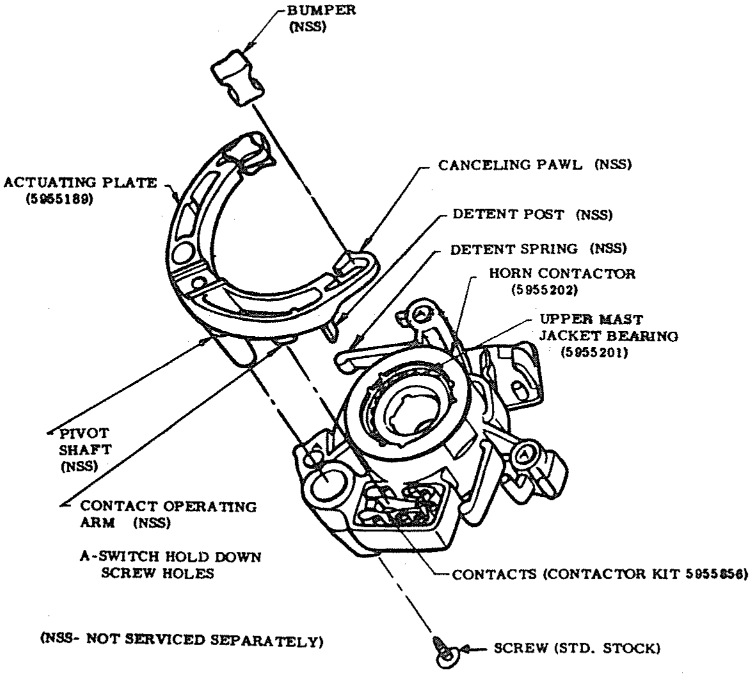

BUMPER (NSS)
ACTUATING PLATE (5955189)
CANCELING PAWL (NSS)
DETENT POST (NSS)
DETENT SPRING (NSS)
HORN CONTACTOR (5955202)
UPPER MAST JACKET BEARING (5955201)
PIVOT SHAFT (NSS)
CONTACT OPERATING ARM (NSS)
A-SWITCH HOLD DOWN SCREW HOLES
CONTACTS (CONTACTOR KIT 5955856)
(NSS- NOT SERVICED SEPARATELY)
SCREW (STD. STOCK)
A
A

Fig. 18

Switch Used on Chevrolet Series 1000

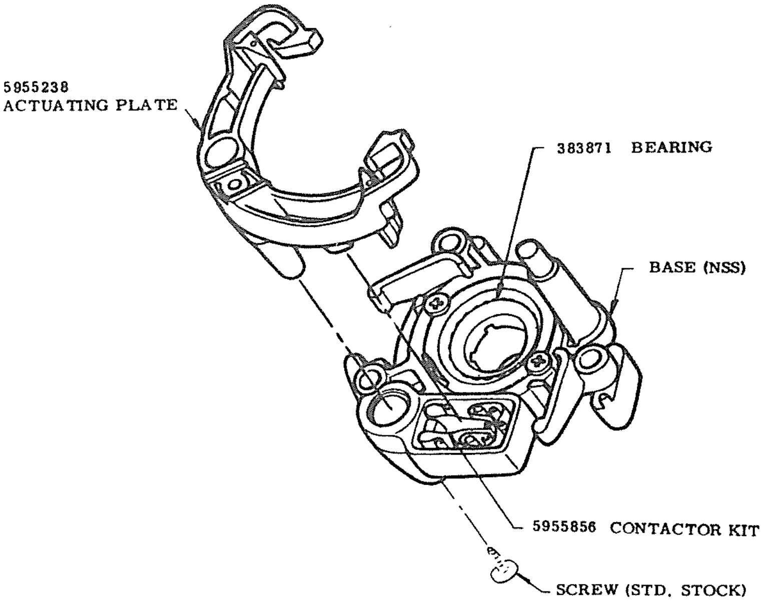


Fig. 19.

Switch Used on Chevelle Series 5000 and Oldsmobile Series 3000, 3100, 3200

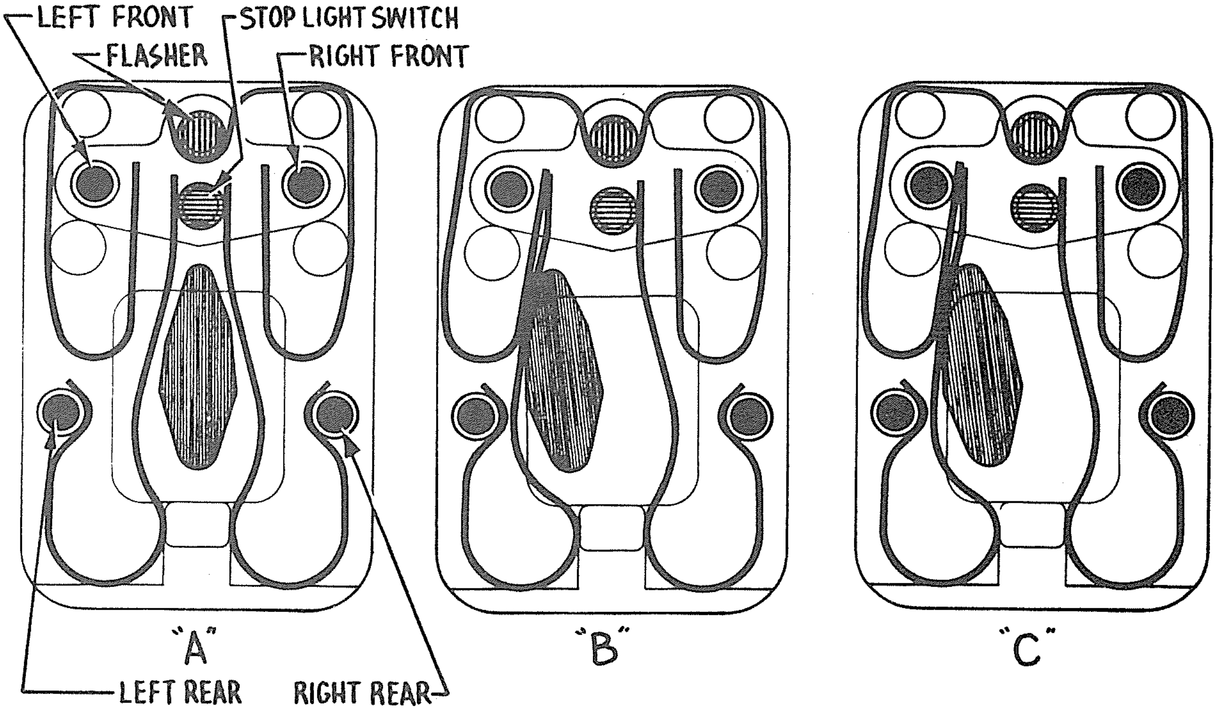


Fig. 20.

Operation of Switch Contacts

Referring to Figs. 18 and 19, inspect the cancelling pawls, detent arms, and detent springs for proper function.

Referring to Fig. 20 as a guide, inspect the contactors and replace if necessary.

Included in this item is a diagnosis chart summarizing the common complaints and their recommended correction.

Parts Information

The foregoing illustrations, Figs. 18 and 19, show the parts nomenclature and part numbers for the two basic switches used on the various car lines.

Operation of Switch Contacts

The diagram, shown in Fig. 20, illustrates the operation of the switch contacts for a left turn signal. Right turn signal is opposite.

1964 Directional Switch Assembly Complaint - Diagnosis Chart

Complaint	Diagnosis	Corrective Action
No cancel	1. Cancelling pawl broken or worn. 2. Cancelling cam broken or worn. 3. Tight pivot shaft.	1. Inspect actuating plate - replace if necessary. 2. Inspect cam - replace if necessary. 3. If items 1 and 2 appear satisfactory, install new actuating arm. (Be sure arm is properly lubricated.)
Over Cancel	1. Detent springs not properly contacting arms (Refer to Fig. 18). 2. Actuating plate loose at pivot shaft.	1. Replace actuating plate or switch assembly as necessary. 2. Re-work actuating plate by removing material from end of pivot shaft until correct tension is achieved.
Either or Both Stop Lights Inoperative (Bulbs and Wiring Check Okay)	1. Bent switch contacts. 2. Open circuit in turn signal harness.	1. Replace switch contacts. 2. Repair harness or replace switch assembly.
One Directional Signal (One Side) Inoperative (Bulbs Check Okay)	1. Bent switch contacts. 2. Open circuit in wiring.	1. Replace switch contacts. 2. Repair or replace as necessary.
Neither Directional Signal Operative (Bulbs and Flasher Check Okay)	1. Bent switch contacts. 2. Broken contact operating arm on actuating plate. 3. Open circuit in flasher wiring.	1. Replace switch contacts. 2. Replace actuating plate. 3. Repair or replace as necessary.

FUEL PUMP ATTACHING BOLT HOLES LEAKING CRANKCASE OIL - 1963-64 Series 1000 Cars Equipped With Six-Cylinder Engine

Complaints of crankcase oil leaks at the fuel pump attaching bolt hole locations on the above models, may be due to lack of sealer on the fuel pump bolt threads.

Sealer is specified for the attaching bolt holes since they are thru holes into the crankcase.

To correct or prevent leaks in the Field, Permatex #3 or equivalent should be used whenever the fuel pump is being installed.

NEW PLASTIC OR DELRIN LINED SPEEDOMETER CABLE CASING - 1964 Series 1000 - Cars

Commencing with the vehicle identification numbers listed below, a change was made in Production to use a plastic or Delrin lined speedometer cable casing on the above models.

Casing and Cable Assembly

Model	Service Type	G. M. Part Number	Vehicle Identification Number
230 and 283 Automatic	CC75	5737623	41111025181
230 Synchro-Mesh	CC93	5737624	41169030664
283 Synchro-Mesh	CC93	5737624	41235030839
V-8 Four-Speed	CC75	5737625	41447060924

The speedometer core or drive cable has not been changed. When replacing the core or drive cable, lubricate very lightly with speedometer cable lubricant #ST640.

When reporting speedometer frame failure, due to excessive bushing wear or cable failures, it is important that the vehicle identification number, mileage and the type of transmission be shown on the report. This information is required in order to determine if the new cable is beneficial in reducing speedometer frame and cable failures.

CLUTCH PEDAL BUMPER OR STOP SHORTENED TO INCREASE PEDAL TRAVEL AND REDUCE GEAR CLASH - 1964 Series 1000 Cars Equipped with Synchro-Mesh Transmission

The clutch pedal rubber bumper, or stop, has been reduced in length by 1/4" on the above models. This change was made to increase overall pedal travel and reduce gear clashing when shifting into low and reverse. The new bumper was used in Production at vehicle identification #41169075594 and is .370" in length whereas the old bumper was .620" in length. These dimensions do not include the extension or retaining button.

In the event gear clash when shifting into low and reverse is encountered in the Field, 1/4" may be cut off the original stop or bumper. The clutch pedal lash must then be re-adjusted to specifications.

The original .620" bumper, part #3723230, will be retained for Service due to the numerous applications. When replacement is required on the above models, shorten the bumper by cutting off 1/4".

Note:- Regardless of the amount of clutch pedal travel, clashing of the gears will occur if the transmission is shifted into low or reverse too quickly or before the clutch is fully released. The clutch driven plate has a tendency to continue rotating, due to momentum, and this must be taken into consideration.

WATER PUMP PULLEY FAILURE - 1963-64 Series 1000 Cars Equipped With Six-Cylinder Engine

Failure of the water pump pulley on the above models may be caused by the pulley reinforcement, part #3720616, being omitted or installed incorrectly, which results in the centre section of the pulley breaking out. The correct location for the reinforcement is in front of the pulley, as shown in Fig. 36, and it is essential that the reinforcement be installed in this manner on six-cylinder engines used in the above models.

Note:- The reinforcement is not used on any passenger car V-8 engine.

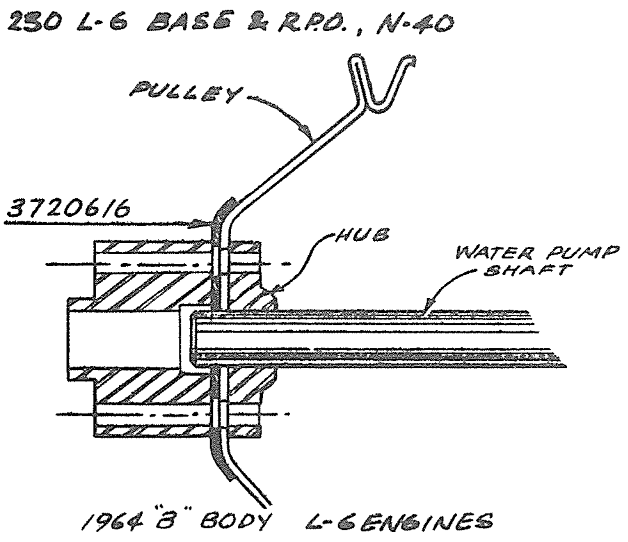


Fig. 36.

RAT GETS NEW MUFFLER

New Muffler Introduced Carrier, Cargo, (RAT)

A new muffler (2990 - 21 - 116 - 6610) has been released for use on both sides of the subject vehicle. This part replaces the left and right assemblies previously scaled.

It will be necessary for workshops to locate and drill new holes in the hull to accommodate the slightly different mounting brackets. This can best be done by drilling on assembly using the new part as a template.

TRAINING NOTES

Programmed Instruction

PTO has heard from the 'field' that the TEMAC Programmed Learning Material is being well received. The first written report has arrived in DEME. We hope that the remaining reports and the results of the Dec 64 Pre-group 4 Assessment will prove that programmed instruction is an improvement over the past methods used in assisting RCEME tradesmen to prepare for the Pre-group 4 Assessment.

If programmed instruction proves itself for mathematics, DEME will endeavour to obtain suitable programmed texts for the remainder of the academic portion of the Pre-group 4 Assessment.

Pre-Group 4 Assessment

The next Pre-group 4 Assessment will be conducted on 8-9 Dec 64. You are reminded that future assessments will be held only in Dec. We wish success to those candidates writing the assessment this year.

Trade Specifications

The following new trade specifications have been authorized and should be published shortly in The Canadian Army Manual of Trades and Specialties:

- Master Aircraft Technician
- Aircraft Technician
- Master Aircraft Instrument-Electrical Technician
- Aircraft Instrument-Electrical Technician
- Metals Technician.

The Radio Technician trade specification is being re-written. The new specification will call for courses at the group 1 and group 3 level. Qualification for group 2 will be by in-job training and trade test, as in other trades.

The Master Instrument Technician and Instrument Technician trade specifications will be amended to include responsibilities for teletypewriters and motion-picture projectors.

Trade Tests

A radio technician group 2 trade test is now being produced. It will be in the same form as the new trade tests for vehicle mechanics wheeled group 2, vehicle mechanics tracked group 2, and electrical technicians group 2.

Courses

RCAF Station Camp Borden will be training aircraft technicians group 1 and aircraft instrument-electrical technicians group 1. These courses will eventually do away with our requirement for basic aircraft trades training at the US Army Transportation School, Ft Eustis, Virginia.

M113A1 Training

The Canadian Army's first four M113A1s have been received, two at RCEME School and two at 4 Fd Wksp. These vehicles will be used for the training of RCEME tradesmen.

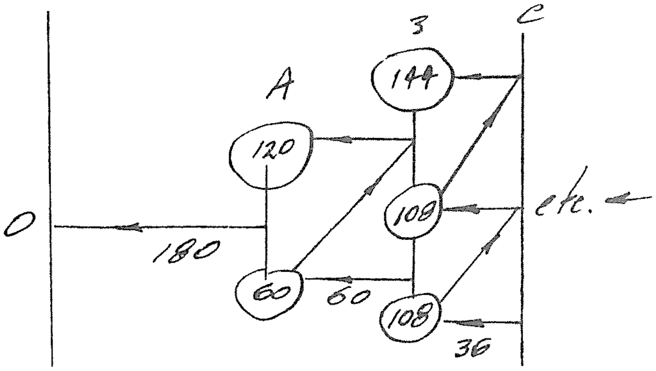
Two training packages have been produced by the Food Machinery and Chemical (FMC) Corporation, the manufacturer of the M113A1, for M113A1 training at RCEME School and 4 Fd Wksp. These packages arrived at both locations in late Oct. Each package consists of M113A1 assemblies and components, assembly and run-in stands, M-I-G welding equipment, tools, wall charts, films, lesson plans, etc.

In addition to the two training packages, FMC Corporation is providing two instructors at each training location for 23 weeks. These instructors will set up the maintenance and welding courses and conduct the first few courses. The candidates on these initial courses in Canada and Germany will be primarily key personnel, many of whom will be the instructors who will carry on with instruction after the FMC Corporation's instructors leave in Mar 65.

M113A1 maintenance and welding courses will be run in 4 CIBG until all applicable personnel of 4 CIBG have been qualified.

ANSWER The Truck in the Desert

Use the attached diagram and work backwards from the objective to the starting point. The first assumption that must be made is that the heavy vehicle is not affected by the gas carried, ie, the figure economy of 1 mile per gallon is constant. This might be necessary to put in the body of the problem as it might lead to people getting waylaid. Clearly for best efficiency the vehicle must reach the last point 'A' of dumping with enough gas left in the tanks so that when the amount previously dumped is added to it the total will be 180 gallons, whereby the last trip can be a maximum of 180 miles. Acquiring these 180 gallons calls for a minimum of two forward trips from the previous dump, which means that the vehicle made a one round trip of starting with a full quota of 180 gallons and returning empty, and a final one-way trip also with 180 gallons. Depositing the required total of 180 gallons, the truck used up the added 180 gallons for transportation in three trips, each of which must have been 60 miles. Similarly we can develop the rest of the problem. Thus when the vehicle reaches the previous dumping point for 'B' for the last time, ready to take off for 'A', it must have deposited, including the amount left in the tanks, a total of 360 gallons, to handle the three trips of 60 miles between 'B' and 'A' and the last trip of 180 miles from 'A' to 'O'. This needs 5 trips, the distance from 'C' to 'B' being evident from the diagram as 180/5 or it could be found if algebraic confirmation is required from the equation 2 (180-2X) + (180-X) = 360 from which X = 36 miles. Clearly the vehicle deposits at each successive dump 180 gallons less than had been accumulated at the previous dump; the 180 gallons being used up in each case for the transportation between dumps. The successive distances between dumps, starting from destination, are thus shown to be 180, 180/3, 180/5, 180/7, etc, up to 180/21 or 180, 60, 36, 25.714, 20, 16.363, 13.864, 12, 10.589, and 9.474, 8.571 which adds up to 392.557, leaving 7.443 (rather than 180/23 which is 7.826 miles) as being the cutoff point of the logic and the most economical distance between the desert edge and the first dump. As explained, the vehicle must deposit a total of 11 x 7.443 gallons or 1980 gallons at the first dump, consuming 23 x 7.443 gallons for transportation in so doing, for a grand total of 2151.2 gallons. So that, 180 - 2 x 7.443 gallons or 165.116 gallons would be deposited on each of the first 11 forward trips and the remainder of 163.724 gallons on the last trip. Simple, what???



ANSWER Gears in The Arctic

I have made a sketch for the "Gears in the Arctic" problem. There are again a number of solutions possible. The one I like the best decides that they are bevels and only uses nine gears. See the sketch - Gear A is held stationary. Gear B rotates around the axis at 1 rpm as its spindle is integral with the slow speed shaft. If the slow speed rotates clockwise then the gear C rotates 2 rpm clockwise. Gear D is attached to C and rotates the same. Gear E rotates on a fixed axis and drive F at 2 rpm counterclockwise. G rotates the same as it is fastened to it. Gear H rotates 2 rpm clockwise around the axis as its spindle is fastened to gears C and D. If G were stationary, then gear I would rotate 4 rpm clockwise, but as G rotates 2 rpm clockwise, it will add 2 rpm clockwise to I making 6 rpm. More involved solutions are possible using all 12 gears as extra width spurs.